

604368

LECTURES ON BOTANY,

AS DELIVERED

IN THE

BOTANIC GARDEN

AT

LAMBETH.

BY THE LATE

WILLIAM CURTIS, F.L.S.

DEMONSTRATOR OF BOTANY TO THE COMPANY OF APOTHECARIES;

AUTHOR OF

THE BOTANICAL MAGAZINE,

AND OF THE

FLORA LONDINENSIS,

&c. &c.

ARRANGED FROM THE MANUSCRIPTS IN THE POSSESSION OF HIS SON-IN-LAW,
SAMUEL CURTIS, FLORIST, WALWORTH.

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TO
JOHN COAKLEY LETTSOM, M.D.F.R.S.

Esq. Esq.

THE EARLY PATRON AND LIBERAL FRIEND

OF THE LATE MUCH RESPECTED

AUTHOR

OF

THESE LECTURES,

OF LITERATURE,

AND THE ARTS AND SCIENCES IN GENERAL,

THIS WORK,

IS, WITH THE UTMOST DEFERENCE AND RESPECT,

GRATEFULLY INSCRIBED,

BY HIS SINCERE AND MUCH OBLIGED FRIEND,

SAMUEL CURTIS.

SECTION I.

Continuation of the Parts of Fruetification.

IN our last lecture, Gentlemen, we shewed you, that the Parts of Fruetification were seven in number, viz. The CALYX, the COROLLA, the STAMEN, the PISTILLUM, the PERICARPIUM, the SEMEN, and the RECEPTACULUM.

We informed you, the Calyx existed in most flowers; that it was usually of a green colour; that in some flowers it was entirely wanting, as in the Tulip; that, according to the different appearances it assumed, it was

called by different appellations ; thus when it was placed immediately under the Corolla which it contained, as in a cup, it was called *CALYX PERIANTHIUM*, and that this was by far the most common kind of Calyx ; that when it burst lengthways, and assumed the form of a sheath, it was called *CALYX SPATHA*, as in the Narcissus ; that when it was placed at the foot of an umbel, on the flower-stalk, at some little distance from the flower, it was called *INVOLUCRUM* ; that this kind was common to umbelliferous plants ; and a few others, as the Anemone and Passion-flower ; when a number of little scales were attached to one common thread-shaped receptacle, or stalk, it was called a *CALYX AMENTUM*, or *CATKIN*, exemplified in Hazel ; that the two lowermost leaves, or chaffy husks, which supported the flowers in grasses, was called *CALYX GLUMA* ; that in Mosses, the Calyx took the name of

CALYPTRA, and in Fungi, was called VOLVA.

That the name of COROLLA was given to the beautiful leaves of the flower, which stand within the Calyx, or cup, and were supported by it; that, besides the term Corolla, which was applied to it as a general term, it took the subordinate or partial term of PETAL; that when it was composed of one entire piece, it was called a COROLLA of one PETAL; when formed of two pieces, DIPETALOUS, and so on, according to the number of petals; that the lower narrow part of a Monopetalous Corolla, was called TUBUS, and the upper spreading part, LIMBUS; but in a Corolla of several petals, the lower narrow part of each petal was called the UNGUIS, and the upper spreading part, the LAMINA; and that, according to the different forms it assumed, it was called CAMPANULATA, INFUNDIBULIFORMIS,

4 CONTINUATION OF THE LECTURE

HYPOCRATERIFORMIS, ROTATA, RINGENS, CRUCIATA, and PAPILIONACEA.

That when a number of flowers were contained within one common Calyx, the Corolla was called COMPOSITA; and that of compound flowers, there were three sorts, viz. LIGULATA, TUBULOSA, and RADIATA.

We come, in the next place, to consider the NECTARIUM, a part so various in its form, as scarcely to admit of a definition, being frequently an appendage or continuation of the Corolla, as in Narcissus, Larkspur, Valerian, and Orchis; more rarely of the Calyx, as in Indian Cress, and very often wholly distinct from both, as in Aconite, Columbine, and Grass of Parnassus, often appearing in the form of a gland, secreting honey, as in Willow, Crown Imperial, Geranium, and many of the aromatic plants, in many of the fruit-bearing trees, as well as in the Indian Cress.

The inside of the Calyx is lined with a glandular substance, which secretes honey. In some flowers, especially in the Hellebore, the Nectarium appears in the form of a number of little cups, containing honey. In a great variety of instances, the Nectarium appears to be totally unconnected with the business either of making or containing honey, as in the Passion Flower, where it assumes the appearance of threads, which, in the common sort, spreads out like a number of rays in the centre of the flower; but in the *Passiflora Alata* stand upright, and form a kind of cup. In some of the Iris tribe, the Nectarium appears like a kind of beard at the base of some of the petals.

To enumerate all the varieties of Nectarium would be almost endless, as we before observed. If any part occurs in a flower, whatever may be its form, if it does not appear to answer the purpose of any of the other

parts of the fructification, it may be safely considered as a Nectarium.

Within the Corolla of most flowers, a number of small threads are observable, these, in the plural number, are called Stamina, or, if we make an English word of it, Stamens; individually, a Stamen.

These come next to be treated of.

The STAMEN is composed of three parts, viz. The Filament, the Anthera, and the Pollen.

The Filamentum is the slender thread-like substance which supports the Anthera, and connects it to some part of the Fructification, most commonly to the Corolla, frequently to the Calyx and Receptacle, and sometimes to the Pistillum. Like the other parts of the Fructification, it is generally subject to vary; its most common shape is broad at the bottom and tapering to the extremity, yet in the Passion Flower, and several other plants, it is of the same thickness throughout. The

filaments are either very long, as in Night-blowing Cereus, Longflowered Marvel of Peru, Amaryllis Formosissima, and most of the Lilies : very short, as in Primrose and Cowslip, or entirely wanting, as in Indian Flowering Reed ; naked, as in the generality of plants ; or covered more or less with hairs, which in different plants put on different appearances, as in Mullein and Spiderwort. The Filaments are exceedingly hairy, as they are also in the Pimpernel, in which, if the hairs are magnified, they appear curiously jointed. The Filaments also differ with respect to number, proportion, and the manner in which they are connected together, which we shall more fully show you when explaining the Linnæan System, which is in part founded on these several particulars.

We come next to the ANTHERA, which may be defined to be that part of the Fructification, which contains the Pollen, or Impregnating Dust, let its form be what it may.

In general it is composed of two oblong or roundish cavities or cells, connected together at their backs, so as to form a kind of double case, each of which, when arrived at maturity, bursts longitudinally throughout its whole length; the cavities are as it were turned inside out, and thus the Pollen is discharged in most plants gradually; in some, however, it is thrown out all at once, with considerable violence; this is effected by means of the Filament, which being curled up like the spring of a watch, is suddenly set at liberty, and the Pollen flies off in little clouds. This curious phenomena is very apparent in the Pellitory of the Wall, and Stinging Nettle, if viewed in a morning when the sun shines on the plants in flower: for the most part there are two cavities to each Anthera, but in some few instances, the Anthera consists of but one cavity, as in the Hazel.

In most flowers it is observable, that the Antheræ burst longitudinally throughout



PLATE XLIX.

ON THE PARTS OF FRUCTIFICATION.

Fig. 1.—The Calyx of the Male Flower of the Stinging Nettle, containing the Anthera, which are ready to discharge their Pollen; bent inwards.

Fig. 2.—The same in the act of discharging their Pollen, 3. being performed by means of the elasticity of the Filaments, which, on the approach of moisture, or the sun shining on them, suddenly spring back; the Antheræ at the same time burst longitudinally, and the Pollen flies off in little clouds.

Example.

Stinging Nettle.

their whole length; but in some flowers there is a little hole at the top of each of the cavities, out of which the Pollen is discharged; and it is worthy of notice, that those flowers which discharge their Pollen in this way, generally hang down, as in the Nightshade, *Leucojum*, and Snow-drop.

As every part of the Fructification varies in different flowers, so do the Antheræ; some are nearly round, and separated from each other by an intervening membranous substance, as in the Spurge, and Dog's Mercury; others are flat, as in the *Ranunculus*; some oblong, as in the Tulip and Lily; some kidney-shaped, as in the Mallow; some twisted, as in the *Chironia*; some furnished with little horns, as in the Heaths; some terminated by a membrane, as the Violet; nor do they differ less in their appearance, previous to, and after the discharge of the Pollen; from oblong, they become forked at each end, as in the grasses; semilunar, as in

the Honeyfuckle; heart-shaped, as in the Flowering Rush; arrow-shaped, as in the Crocus. If we could wish, therefore, to ascertain their true shape, or exact number, we should examine them while they are yet inclosed by the Corolla, before they have discharged their Pollen, or suffered from the inclemency of the weather.

The Antheræ differ also with respect to the mode in which they are connected to the Filaments: in most flowers, the Filament is inserted near the end of the Anthera, in which case the Anthera is generally erect; sometimes it is connected to the middle of the Anthera, and then it usually lays across the Filament; when so situated, they are called Incumbents. Sometimes the Anthera turns on the Filament, as on a pivot, moving almost in every direction, as in the Passion Flower; such kind of Antheræ are called Versatiles; when it has no Filament, but grows on to some part of the Fruetification, it is called Anthera Adnata, as in *Canna Indica*.

The Pollen, or Impregnating Dust, contained in the Antheræ, which constitutes the third component part of the Stamen, and which, to the naked eye, appears like a fine powder, when examined with the microscope, is found to consist of a number of corpuscles, altogether different in their forms and sizes in different plants, each of which contains within itself a still finer set of corpuscles. Of this substance we shall speak more fully in our Lecture on the Sexes of Plants. We may remark, that its most usual colour is yellow, but in the *Hypericum Pulchrum*, it is of a fine scarlet; in Poppy, greenish; in Tulip, almost black; in *Polygonum*, white; and that this is the substance of which the industrious bee forms its waxen cells.

From the Stamen we pass on to the Pistillum.

The PISTILLUM is placed in the very centre of the flower, and like the Stamen, is

composed of three parts, viz. The Stigma, Stylus, and Germen; of these three parts it usually consists; two of them are always, and must necessarily be present, viz. the Stigma and Germen. The Stylus may be, and often is wanting; for, like the Filament, it is not an essential part of the Fructification. The Stigma, then, is the top; the Stylus, the middle part; and the Germen, the bottom of the Pistillum. This latter, which finally becomes the Pericarpium, or Seed-vessel, by some Botanists has been called the Ovary, or Rudiment of the fruit.

The Stigma is usually placed on the top of the Stylus, as in Primrose, or if the Stylus be wanting, immediately on the Germen, as in Tulip and Poppy. The Stigma is exceedingly various in its form, indeed no part of the Fructification is subject to a greater diversity of appearance; this may be said of it in general, that it is for the most part covered with a kind of downy or

velvety substance, which is more conspicuous in some flowers than others; in the Poppy, for instance, the Willow Herb, the Lily, and a variety of other flowers; this velvety surface is very apparent, and many of those Stigmata, which to the naked eye do not exhibit this appearance, appear so when magnified. In some plants, particularly the grasses, there does not appear to be any regularly formed Stigma; but the Styles are finely ramified, like a piece of down, and seem to perform the office of the Stigma; in the Indian Corn, the Styles are exceedingly long and slender, like threads; they have no particular Stigma at their extremity, but throughout their whole length are covered with fine hairs, whence it is probable, that every part is analogous to the substance of the Stigma, except that in some instances of this kind, most Pistilla have an evident peculiarity of structure at their extremity, and where that is wanting, the delicate structure of the

Styles seem to make amends for its deficiency.

Now the Stigma is either single or divided into two, three, or more lacinix, or segments; it may be bifid, as in Thyme; trifid, as in Crocus; quadrifid, as in Willow Herb; quinquefid, as in Crane's-bill; globular, as in Primrose. It may have a hole on one side of it, as in Pansie; it may be hooked, as in the common Violet; simple, as in Nightshade, or Comfrey; flat and orbicular, as in Poppy; the divisions spreading, as in Iris, where they assume the appearance of Petals, or, rolled back as in Dandelion, and most of the compound flowers; in short, this part will scarcely be found similar in any two flowers.

The seventh part, the RECEPTACULUM, or THALAMUS, is the base which connects the other six parts of the Fructification; being more simple than the other parts, it has not so great a variety of parts or singularities

to describe, the principal varieties are Common, Proper, Umbella, and Spadix.

A Common Receptacle is when it supports many Flosculi, and chiefly applies to the compound flowers.

Proper, when it supports but a single Fructification.

UMBELLA, when it supports from a common centre, several small footstalks of proportionate lengths.

SPADIX, or the Receptacle of a Palm, produced within a Spatha, or Sheath.

SECTION II.

On the Parts of Fruetification in the Mosses.

IN order, Gentlemen, more fully to answer the intention of our Lectures, to render them more complete, and to gratify the wishes of many of you, who seemed laudably desirous of obtaining all the Botanic knowledge in your power, I propose giving you a lecture on SOME of the plants of the Cryptogamia Class. I say, SOME of them, because it is not in my power, for various reasons, to explain to you the structure of all the plants of this numerous and difficult class.

The plants which I propose for the subject of this lecture, are chiefly what are generally

known by the name of Mosses, and which are of the order Musci in the Linnæan System, and more particularly such of those whose structure I have taken no small pains to acquire a knowledge of, and which I should not be happy without communicating to you at least, whose diligent attention, while it merits my warmest thanks, entitles you to all the information it is in my power to bestow.

Those who are not conversant in the works of Nature, or who have not examined them with a curious and critical eye, may be led to consider the Mosses, which are to be the subject of our lecture, as a set of useless plants, wholly unworthy of their attention; but, certainly, whether we consider their curious and delicate structure, or the various uses they serve in the economy of Nature, we shall have no cause to adopt this idea, but, on the contrary, consider them as highly worthy our notice. It was a saying of the

great Boyle, that he admired Nature's watches more than her clocks ; and we shall doubtless discover as much wisdom in the formation of the smallest Moss, as in the spreading Oak, or lofty Pine.

The Mosses differ very essentially from the more perfect plants ; they differ not only in their structure, but likewise as to the time in which they produce their fructification. Plants in general vegetate and blossom in the summer months, but winter is the season which best suits the Mosses ; when all other plants and trees shrink, as it were, from the piercing cold, drop their leaves, or return to the earth, these seem to exult even at frost and snow, cover the earth and the trees with a beautiful verdure, which makes even winter pleasing, and animates the botanist with an idea of perpetual summer.

The Mosses are a set of plants which in one respect are very agreeable to the botanic student, for if they are become ever so dry,

on being placed in water every part of them expands, and they become as fresh and as green as when first gathered. Thus we see the *Bryum Hornum* has its leaves dry, shivered, and curled up, but on putting it into a phial of water, it almost immediately expands again. And some of the Lichens, go even farther than this ; for, on being continued for some time in a proper situation, though they have been preserved dry for a considerable number of years, they re-assume their vegetative property, grow and flourish.

This is a circumstance which would surprize us the more, had not the world been lately informed, that even some animals have been found to possess a similar property ; that Snails which had been kept in a cabinet for a number of years, on being placed under certain circumstances, have re-assumed life, and crawled about as usual. This however, how true soever it may be, will scarcely be

credited but by those who have had ocular demonstration of it.

The Mosses, in the more general acceptation of the term, contribute their share of utility in the economy of Nature, and are more useful to mankind, perhaps, than is generally imagined.

Without these, walls, stones, and rocks, would exhibit a naked, barren, and unpleasing appearance; but, exclusive of the entertainment they afford the eye, they form the first vegetable covering, and from their accumulation and decay, vegetable mould is first formed, which paves the way for the growth of larger, and what are esteemed more useful plants.

We have daily opportunities of observing this; if we notice a wall that has been newly built, we shall see it the first year partly covered with *Bryum murale*, and in a year or two more, when a little vegetable mould is formed, other Mosses make their appearance, as the *Bryum cespitium*, *argenteum*, &c.

These, by the decay of their roots, gradually increase the quantity of vegetable mould, till a sufficiency is accumulated for the growth of larger plants. And next the *Draba Verna*, and *Saxifraga Tridactylites* make their appearance, and are generally succeeded by Dandelion, Grass, Groundsel, and other plants, which thrive on the old wall nearly as well as in their natural soil.

The nearer we approach either to the North or South Pole, the more we find the earth abound with Lichens or Liverworts; as we advance from thence towards the equator, the next class of plants which occur within a certain space are the Mosses, then the Grasses, and within the Tropics we find the Palms abound; such then appears to be the natural gradation of the earth's covering, and hence the Lichens and Mosses will be found most serviceable to those who inhabit the Northern regions; indeed their very existence depends in a great degree on the

growth of these plants, as we shall shew by and by.

Mosses afford warm and secure winter quarters to a variety of insects, which must otherwise perish through the inclemency of the weather, and they not only afford them a domicilium in the winter, but likewise serve them for food in the summer. A particular species of moth, which the Aurelians call a Bishop (and which does not appear to have been noticed by writers on natural history) feeds in its caterpillar state, on the Lichens, which grow commonly on walls; here you see the insect in its perfect state, and doubtless a variety of other insects are supported by the same kind of food.

The bottoms of low wet meadows are frequently covered with Moss, which not only serves to secure the roots of the grass from the frost in the winter, but supplies cattle, and particularly sheep, with food

early in the spring, before the grass begins to shoot.

In Lapland, the Mosses and Lichens are of the greatest utility, of the *Polytrichum Commune*, or Golden Maidenhair, they make their beds, and on these kind of beds Linnæus often slept during his journey through that inclement country, and so pleased was he with them, that he has been lavish in their praise. It appears that they have been taught to apply it to this use from the example of the bear.

From the stalks of this *Polytrichum*, the poor people who live in Woolmar forest, Hampshire, make small brooms, for the purpose of brushing the furniture of beds, &c. under the name of Silk Wood.

The Lapland women make great use of the *Sphagnum Palustre*, which is a very soft Moss; they put it in the cradles of their children, and by being wrapped round them,

it keeps them both warm and dry. But the Laplander's greatest riches consist in the Lichen Rangiferinus, or Rein Deer Liverwort; this is the most useful vegetable that grows throughout all Lapland.

Parts of Fructification in the Mosses.

Vide Pl. 50.

PEDUNCULUS.

BULBILLUS.

PERICHÆTIUM.

CAPSULA.

CALYPTRA.

OPERCULUM.

ROSTRUM.

CILIÆ.

ANNULUS.

SEMEN.

RECEPTACULUM.

SPHÆROPHYLLUM.

STELLULA.

The Mosses, in their fructification, have some analogy to the Ferns, although the

structure of their Capsules is considerably different, and hence the parts of which they are composed acquire different names.

In the Ferns we showed you that the Capsules containing the seed, grew on the back of the leaves; in the Mosses they in general grow on a Peduncle, or Footstalk, which elevates them considerably from the plant itself; this kind of stalk is called by the usual name of PEDUNCULUS; the base of it is furnished with a small kind of bulb, which, when naked, is called BULBILLUS, as in most of the Bryums; when covered with Squamulæ, or small leaves, as in most of the Hypnums, PERICHÆTIUM. The little head which terminates the Peduncle, we distinguish by the name of CAPSULA, rather than by Linnæus's term of Anthera, for reasons which we shall hereafter give. On the summit of the Capsula is placed the CALYPTRA, a thin membranous substance, which serves the purpose of a Calyx, and

covers the Capsule somewhat in the manner that an extinguisher does a candle. The upper hollow part of the Capsule, which spontaneously separates from the main body, is called the OPERCULUM, or cover, and this frequently terminates in a long point, which is called its ROSTRUM. The CILIÆ are small kind of hairs usually broader at bottom than at top, fixed to the edges, and surrounding the mouth of the Capsule, and appearing when the Operculum falls off. The ANNULUS is a kind of ring, or circular protuberance, at the neck of the Capsule, where the Operculum fits on. The SEMEN (POLLEN of Linnæus,) is the fine powder contained within the body of the Capsule; and the RECEPTACULUM is the body to which the seeds are connected within the Capsule.

Besides the parts which are found to exist in most of the Mosses, there are some few which have a structure extremely different,

and whose appearances have obtained the names of SPHÆROPHYLLUM and STELLULA. By a Sphærophyllum, which is a term made use of by Necker, we mean a very minute and naked Capitulum, or head of a spherical figure, generally placed at the extremity of the Peduncles, in the same manner as the Capsules are; when examined with the microscope, it puts on a kind of granulated appearance; it is of a green colour when it first springs forth, and continues of the same colour and size to the time of its decay; it has been considered as a congeries of seeds, but in fact its real structure or uses are altogether unknown, and will probably continue to be so on account of its extreme minuteness.

The Surculi, or Stalks of many of the Mosses, instead of being terminated by a Peduncle, or Stalk, are terminated by an expansion of the leaves only; these kind of expansions are called STELLULÆ, or STELLULÆ FÆMINÆ; in the centre of

them, from whence the Peduncle usually springs, is a Congeries, or Tuft, of a vast number of minute Corpuscles, which, when examined by a good magnifier, appear to be of two different kinds, the one articulated white and pellucid, the other greener, and a good deal of the shape of a nine-pin. They have nothing in their structure similar to a Stamen, Pistillum, or Seed, hence their uses are wholly unknown to us: both Sphærophylli and Stellulæ exist chiefly in the Genus *M. nium*.

Having now, Gentlemen, demonstrated to you all the parts which are common to Mosses in general, we shall speak a little more fully on the history and uses of each particular part.

The Footstalk which supports the Capsule, springs either from the side or top of the stalk; when it springs from the top, it is usually furnished with a Bulbillus, and these two characters constitute the genus *Bryum*;

when it arises from the side of the stalk, it has in general a Perichæcium, and then it forms a Hypnum. The colour of the Peduncle is most commonly red; it is in general upright at first, but frequently turns down at top, as in the *Bryum Cæspititium*, &c. In the *Bryum Hygrometricum*, it often bends down to the ground, and has another very singular quality, if Linnæus does not misinform us, which is, that if the base of it be moistened, it turns its head round three or four times, as the Arista of an Oat or Geranium does, and then, if the Apex be moistened it turns back again, and hence its name of *Hygrometricum*. On the summit of the Peduncle appears the Capsula, covered with its Calyptra, which may be considered as a kind of Calyx inverted; it is of a membranous texture, and generally of a whitish yellow colour; in most Mosses it is smooth, but in the genus *Polytrichum* it is rough or hairy. The Capsule, at its first appearance,

is not much thicker than the footstalk which supports it, and in this state it is wholly covered by the Calyptra. As the Capsule swells and enlarges, the lower part of the Calyptra generally bursts and splits open, but the Calyptra still remains on the Capsule, and continues on it in many of the Mosses, till they have attained their full size, being kept on by the Rostrum of the Operculum, which it covers as a glove does the finger; hence the longer the Rostrum of the Operculum, and the slenderer the Capsule, the more tenacious is the Calyptra, as in the *Bryum Scoparium*; and on the contrary, the shorter the Rostrum, and the rounder the Capsule, the sooner it is deciduous, as in the *Bryum Pomiforme*.

The Capsule being now become changed from a green to a reddish brown colour, the Calyptra first falls off, and next the Operculum; though it frequently happens that from the close connection, they drop off together.

As soon as ever the Operculum is removed from the neck of the Capsule, the exterior row of the Ciliæ immediately diverges in a beautiful manner, with a kind of elasticity, and is expanded horizontally; the inner row is observable converging to a point, so as to assume a conical appearance; at the apex of this cone there is a sufficient opening for the seed to make its way out of the body of the Capsule. The outermost Ciliæ, which are perfectly distinct and unconnected with each other, in a short time close again in some degree, and remain nearly upright, with their apices bending inward. The innermost Ciliæ are each of them connected together by means of a fine membrane, which, when magnified, puts on a reticulated appearance, except at the Apex, where they are loose, hence they are not capable of being expanded as the outer ones are. In some Mosses the structure of the Ciliæ is different, as in the *Bryum Undulatum*, in which, after

the Calyptra and Operculum are dropped off, there appears but one set of Ciliæ, which bend inward, and are connected together at the Apex of the mouth of the Capsule, to a solid substance of a circular form, hence they are incapable of diverging, and the seed is discharged through the interstices, betwixt each of the Ciliæ, and not at the Apex. When the Capsule is so ripe as to throw off its Operculum, the least touch will make it throw out its seed, which it does somewhat in the manner of a barber's puff. In some Mosses, both the exterior and interior Ciliæ are wanting entirely, as in the *Bryum Truncatum*. In some the exterior row is wanting, and the interior row is twisted in a remarkable manner. In the *Hypnum Rutabulum*, which may be found in every wood in December or January, the Ciliæ themselves, which are remarkably conspicuous in this species, are ferrated, or furnished with little teeth. In some species of Moss the Ciliæ are long and

end in a fine point ; in others they are very short, and very numerous, so as to deserve the name of little teeth, rather than Ciliæ, as in the *Polytrichum Subrotundum*.

The particular use of the outermost Ciliæ, is not very apparent, yet some authors, willing to shew their great ingenuity and perspicuity, have assigned to them a very singular one ; they have considered them as the Stamina of the Mosses, to which they have in no one respect whatever the least pretensions ; yet such was the theory of Dr. Hill.

At the neck of the Capsule, just at the setting on of the Operculum, is a kind of ring, or circular protuberance, which in some Mosses is considerably more conspicuous than in others. In order to have a clear idea of the Receptaculum, it is necessary that we take the head of some Moss that is of the largest size, and for this purpose the *Bryum Cæspitium* answers very well ; if we cut

it down the middle while it is yet green, we shall discover a round substance which runs through the Capsule, and is fixed to the base and apex of it; this substance while the Capsule is green, is of a cylindrical form, and so thick, as to occupy the greatest part of it; by dextrous management the exterior part of the Capsule may be separated from this receptacle so as to leave it intire, when it not unaptly resembles the club or Receptaculum elongatum of the Arum; now to every part of this receptacle the seeds of the Mosses appear to be affixed. When the Capsule becomes ripe enough to discharge the seeds, the Receptaculum still appears, but very much shrunk and diminished in its size.

We shall now make a few observations on the existence of the sexes in mosses.

And first we would premise that every author who forms a particular system in any science is exceedingly desirous that every part of it should correspond, and if any ap-

pearances occur which militate against his favourite notions, they are either misrepresented, not sufficiently investigated, or purposely omitted. Linnæus having founded his system on the existence of the sexes, which he has no doubt sufficiently demonstrated in the more perfect plants, was led to suppose that they existed also in the more imperfect ones, and hence he has eagerly caught at every thing which at first sight appeared to favour his particular doctrine, without sufficiently investigating those appearances. Hence he considers the Capsules of the mosses as the Antheræ, or male organs, containing the Pollen, the Stellulæ, and Sphærophylli, which we have before described as the female organs which produce the seed. Now in the first place, the little heads which contain this fine powder or Pollen, have nothing in their structure similar to a true Anthera. The substance of an Anthera is always tender and delicate as soon

as they become visible; and as soon as the flower is expanded they shed their Pollen, quickly decay, and are no longer visible. Most of them have two cavities, which open at the side throughout their whole length, in some few indeed they open at top, as in the *Solanum Dulcamara*. Now with this structure, and these properties, we shall find these little heads of the mosses have very little affinity; but on examination we shall discover in them a much greater similarity to that of a Capsule. A Capsule at first is small, green, and tender, so are these. A Capsule gradually increases in size, and is a considerable time in becoming ripe, so are these. A Capsule when ripe is generally brown and hard, so are these; they frequently remain on the stalk till the succeeding year, so do these. Many Capsules separate spontaneously into two parts, and discharge their seeds, as in the *Anagallis*, which is a Capsule circumscissa, so do these: in many Capsules the seed is affixed to a lon-

gitudinal receptacle, so they are in these. Hence then we have reason to conclude from their structure, that they are not *Antheræ*, containing a Pollen, but Capsules, containing seed, or something analogous to it.

Let us in the next place consider the fine dust contained within these Capsules. We shall not be singular in the opinion, that this dust is the true seed of the mosses. Several modern authors have already adopted this idea, and both *Stehelinus* and *Meese* affirm, that by experiments carefully made, young mosses have been raised from this dust; this, if true, (and we have no reason to doubt it) is a positive proof that they are seeds to all intents and purposes. If they are not seeds furnished with Cotyledons (which perhaps we cannot discover on account of their minuteness) and impregnated with the Pollen, yet they are brought to maturity in the same manner, and in like manner vegetate. If the experiments of these authors needed any

further confirmation, we would bring a kind of corroboratory proof, which is, that if a new wall be built any where, the top of that wall, will, in two years, be covered with *Bryum murale*. Now if we disbelieve the doctrine of equivocal generation with respect to animals, which every rational person must, it is impossible that these mosses can be produced but from seeds of the same species; which must have floated in the air, and been deposited on the wall; there is no other part of the plant but this fine dust contained within the Capsules, which could be thus conveyed, or if conveyed, could produce them in such abundance. For this species has neither *Stellulæ* nor *Sphærophylli*, nor has it any creeping stalk, by which many of the mosses greatly increase, and yet is more fertile, and abounds more than almost any other.

Those who are tenacious of the sexual doctrine, will still perhaps say, of what use

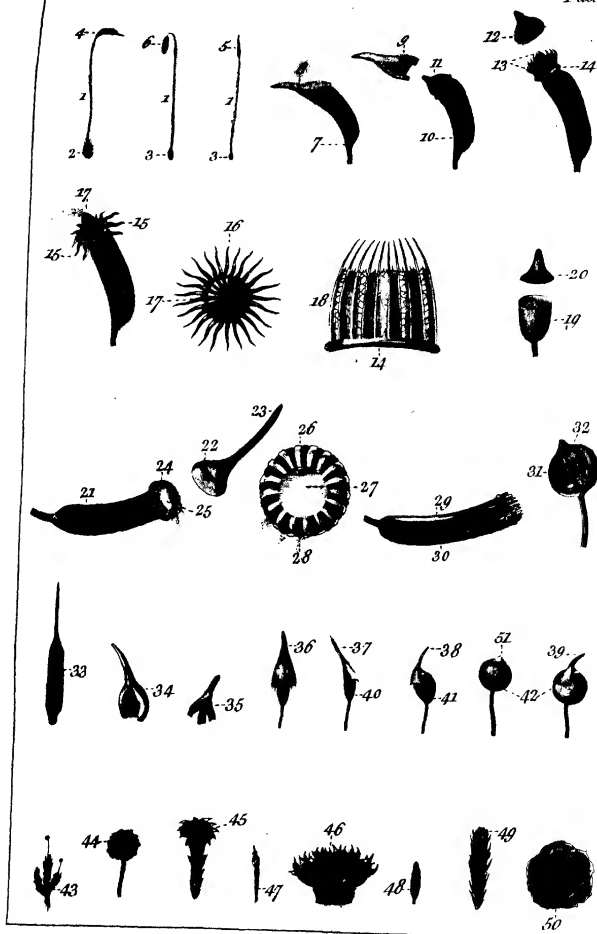


PLATE L.

ON THE FRUCTIFICATION OF THE MOSSES.

Fig. 1.—The *Pedunculus* or Footstalk, which supports the fructification.

2.—The *Perichætium*, at the base of the *Pedunculus*, composed of a number of *folioli* or little leaves, as it occurs in most of the *Hypnum*s.

3.—The *Bulbillus*, or small naked Bulb, as it occurs in most of the *Bryum*s.

4.—The *Capfule*, or *Anthera*, containing a fine powder.

5.—The *Capfule*, as it appears when young in the *Bryum Cespitium*.

6.—The *Capfule*, as it appears in the same Moss when further advanced.

7.—A *Capfule* of the *Hypnum Rutabulum*, covered with its *Calyptra* and magnified.

8.—The *Calyptra* on the *Capfule*.

9.—The *Calyptra* taken off.

10.—The same *Capfule* without its *Calyptra*.

11.—The *Operculum*, or Cover, which fits on to the end of the *Capfule*.

12.—The *Operculum* taken off.

13.—The two rows of *Ciliæ*, which appear in this and many other species of *Hypna* on the removal of the *Operculum*.

14.—The *Annulus*, or Ring, which furrounds the neck of the *Capfule*.

15.—The exterior row of *Ciliæ*, which being unconnected with each other, and endowed with an elastic property, are set at liberty, as it were, on the first removal of the *Operculum*, and bent quite back, presently become horizontal, as at Fig. 16, and finally close, as at Fig. 13.

16.—A front view of the *Ciliæ* when horizontally extended.

17.—The inner row of *Ciliæ*, which are connected together by a membranous substance, and converge to a point, leaving an opening at the apex for the exit of the fine powder.

18.—A section of the inner row of *Ciliæ*, magnified to a greater degree.

19. 20.—The *Capfule* and *Operculum* of the *Bryum Truncatulum* magnified. In this species no kind of *Ciliæ* are observable.

Fig. 21.—The Capsule of the *Bryum Undulatum*, with its Operculum, taken off and magnified.

22.—Its Operculum.

23.—The Rostrum of the Operculum.

24.—Its Cilix.

25.—A solid membranous piece at the extremity of the Capsule, to which the Cilix are connected.

26. 27.—A front view of the mouth of the same Capsule more enlarged, in which the Cilix, the solid piece at the extremity, and the interstices of the Cilix through which the powder is discharged are more conspicuous.

28.—The Powder discharging through the interstices.

29.—A ripe Capsule of the same *Bryum*, without its Operculum, opened longitudinally.

30.—The shrivelled Receptacle surrounded by the fine powder, contained within the body of the Capsule.

31.—A longitudinal section of an unripe head of the *Bryum pomiforme* magnified.

32.—The Receptacle.

33.—The Calyptra of the *Bryum Hygrometricum* on its first appearance.

34.—The same as it is stretched and split by the Capsule when it has nearly acquired its full growth.

35.—The Calyptra of the *Bryum pulvinatum*, which splits at its base into two or three parts.

36.—The hairy or wooly Calyptra of the *Polytrichum commune* of its natural size.

37. 38. 39.—The Calyptra on the Capsules of the *Bryum Pomiforme* magnified.

40.—The Capsule of the same *Bryum*, which at first is oblong, and at length becomes spherical, as at Fig. 42.

41.—Its short Operculum.

43.—A Plant of the *Minum androgynum*, of its natural size, with the Sphærophylli, or little balls, on the top of the footstalks.

44.—One of them magnified.

45.—A Stellula, or Female flower, (as it has been called) of the *Bryum Hornum*.

46.—The tuft in the center of it magnified.

47. 48.—The two kinds of Corpuscles of which it is composed.

49.—One of the Stellula, or Female flowers, of the *Polytrichum commune* of its natural size.

50.—A front view of the same magnified.

then are the *Stellulæ* and *Sphærophylli*; but they should remember, that it is their business to prove that they are the female organs, *affirmanti occumbat probatio*, and that they produce seed, which they have not yet been able to do. If they were female organs, they would exist in all the mosses, whereas they are confined to a few only, and the generality of this numerous tribe of plants are propagated as well without as with them; hence it is evident that they are not essential to their generation: that they answer some use is very probable; but at present that use is only conjectured, not really known.

ON
THE SEXES
OF
P L A N T S.

SECTION II.

On the Sexes of Plants.

BEFORE we speak of the sexes of plants, the subject of to-day's lecture, we shall recapitulate, with some few additional observations, what we have before observed concerning the structure and different appearances of the Stamen and Pistillum, parts essential in this business.

We informed you the Stamen usually consisted of three parts, the FILAMENTUM, the ANTHERA, and the POLLEN. We observed, that the Filament, though usually supporting the Anthera, was sometimes wanting, and,

as its chief use was to elevate the Anthera, it might be wanting without any injury to the economy of the plant ; that the Anthera, as constituting the essential part, must be present in every perfect Stamen. We remarked that the Anthera was usually composed of two oblong or roundish cavities, or cells, connected together at their backs, so as to form a kind of double case, each of which, when arrived at maturity, burst longitudinally throughout its whole length, the cavities were turned inside out, and thus the Pollen was discharged in most plants slowly and gradually ; in some however, from the elasticity of the Filament, it was thrown out with considerable force, as in Nettle, and Pellitory of the Wall. That in some flowers, the Anthera, instead of bursting longitudinally throughout its whole length, had a small foramen at the top of each cavity, out of which the Pollen proceeded, as in Nightshade, and Snow-drop. We observed that

the discharges of the Pollen in such flowers were facilitated by their pendulous situation.

Those Antheræ which unite and form a tube, as in the compound flowers, have two cavities, each of which open inwardly, so that the Style and Stigma in passing up through the tube, come in immediate contact with the Pollen, and on appearing above the tube, are seen covered with it. It seldom happens that all the Antheræ discharge their Pollen at the same time; in many of the Geranium, and in the Lythrum Salicaria, one half discharge their Pollen at one time, and the other half soon after.

We are next to speak of the Pollen, or fine powder, contained within the cavities of the Anthera. The microscope, which has enabled the moderns to throw so great a light on subjects which would for ever have remained in obscurity, has been the means of giving us a clear idea of their structure; by it we discover that the Pollen, which to the naked

eye appears merely as a fine powder, consists of a number of regular corpuscles altogether different in their forms and sizes in different flowers, each of which contains within itself a still finer set of corpuscles, which we may denominate its essence or sperm, and as the Anthera bursts and discharges its Pollen, so does the Pollen burst and discharge its sperm. The bursting of the Pollen, and consequent discharge of the sperm, is found to be greatly accelerated by moisture. If we place the Pollen of almost any flower before the microscope, and moisten it with a drop of water, we see it immediately explode, and throw out its sperm, in the form of extremely minute globules, which vary also as much in size at least as much as the Pollen itself.

We shewed you that the Pistillum varied as much in its form as the Stamen; that it usually consisted of three parts, the STIGMA, the STYLUS, and the GERMEN; that as the Filament was frequently, and without injury,

wanting in the Stamen, so was the Stylus in the Pistillum; but that the Stigma and Germen were necessary in every perfect Pistillum. We remarked that though the Stigma was very differently formed in different flowers, yet that the surface of it was frequently covered with fine villi, which gave it a velvety appearance, and bedewed it with a clammy moisture, whence it is not only admirably adapted to catch the Pollen which may fall on it, but to occasion the Pollen to discharge its sperm, a certain degree of moisture being necessary, as we before observed to produce that effect.

Having now taken a view of these two essential parts in flowers, let us in the next place observe the alteration which takes place in them during the time of their flowering and producing their seeds, and see if we cannot observe something extremely analogous to what takes place in the generation of animals.

If we take a perfect blossom, with the Corolla just expanding, the Antheræ will be found as yet intire; in a very short time the Antheræ open and shed their Pollen; the Germen at this period is very small, and the seeds within it extremely minute; this may be considered as the period of impregnation. In a few days the Calyx and Corolla, whose use was to defend the Stamina and Pistillum, wither and decay; and now the Stamina having performed the office of impregnation, and being no longer necessary, drop of; if we examine the Germen, we find it considerably enlarged, and the seeds much more conspicuous; viewed at a later period, we find the Germen, stretched to its full size, now become the seed-vessel, and containing ripe seeds.

Such then is the alteration which takes place in the generality of flowers, from the time of their beginning to blow, and the ripening of their seeds; the process indeed

may differ somewhat in different plants, as the like parts do not occur in all; some for example have no Calyx; others no Corolla; but no fertile flower has yet been discovered, in which either a perfect Stamen or Pistillum was not discernable. These, then, from every circumstance, appear to be parts essential to the production of the fruit; and if we observe the infinite pains which Nature has taken in their formation; how curiously, how regularly, and how exquisitely they are constructed, shall we not be naturally led to conclude, that they are designed to answer some very important purpose in the economy of the plant; and shall we not very readily adopt, as the most likely, the opinion at present so generally received, that different sexes exist in plants as well as in animals, and that these are the organs of generation.

Linnaeus, though not the first discoverer of this doctrine, has taken more pains to confirm it, and been more instrumental in establishing

it, than any other person. He considers the Stamina as the male, and the Pistilla as the female organs of generation ; and by way of illustrating the subject, compares the several parts of the flower and fruit, to the parts of generation in animals. According to him, the Filaments are the spermatic vessels ; the Antheræ the Testes, the Pollen the Semen, the Stigma analogous to the external parts of generation in females, the Stylus to the Vagina or Fallopian tube, the Germen to the impregnated Uterus, the Seed-vessel the pregnant Uterus, the Seeds the Egg, the time that the Pollen is discharging the period of impregnation ; from the time that the seeds are impregnated to the period of their being discharged the period of Gestation.

Now though this comparison may not be strictly just, there is doubtless considerable propriety in the application, at least we shall be justified in supposing the Germen as ana-

logous to the Uterus, and the Pollen, or its contents, similar to the Semen of animals.

Now to the impregnating the seeds contained within the Germen, or Uterus, it is necessary that the Pollen should be conveyed to the Pistillum, if it is not, either no fruit is produced, or if it is, its seeds will not vegetate.

It will be curious enough then to observe the care which Nature has taken, that the Pollen should be conveyed to the Pistillum. In most flowers the Anthera and Stigma, come in immediate contact, as in the Evening Primrose, and all the compound flowers. Here then the Pollen is readily applied. In those flowers in which the Pistillum is not so near the Anthera, some other means of conveying the Pollen is made use of. If it is nearly of the same length, but not in the same direction as the Stamina, we observe the Stamina placed above the Pistillum, so that when the Pollen is discharged, it shall fall

immediately on the Stigma, as in the *Chironia frutescens*. In other flowers, where the Pistillum is much longer than the Stamina, in general we observe that the flower is inverted or drooping, so that the Pollen may fall on the Stigma, as in the Crown Imperial.

We have a species of Saxafrage in our gardens, which does not appear to be described by Linnæus, which like all the others produces ten Stamina; these when the flower first expands, stand in a circle round the Pistillum in the center, and at the time of their discharging their Pollen they all incline inward, converging to a point on the Stigma, in which situation they afterwards remain till the flowers decay.

A gentleman on whose veracity and accuracy I can place the fullest confidence, informed me of a singular fact relative to this business in the *Collinsonia canadensis*; that plant has two Stamina and one Pistillum; one of the Stamina sheds its Pollen much

fooner than the other; and the gentleman assured me, the Pistillum inclined itself first to one Anthera and then to the other.

In those plants which produce male flowers on one part of them, and female on another, means still different are adopted; here the air acts as a medium to convey the Pollen, which is formed accordingly; being exceedingly minute, as we may observe in the Pellitory of the Wall; so that these particles are scarcely visible to the naked eye, and consequently, being very light, it is diffused, even in the stillest weather, all around the plant, and is thus conveyed to the Pistilla. Had the Pollen in this case been so large as it is in some hermaphrodite flowers, it could not have been conveyed in this way.

Again, in some trees of this kind, the quantity of Pollen is so great, that the least breath of wind disperses whole clouds of it, so that some of it cannot fail in being con-

veyed to the remote Pistilla, as one may be convinced by striking a hazel tree when in full bloom.

Many of the Monoecious plants have the male flowers growing uppermost, as in the Burr reed and Arrowhead, but the necessity of the Pollen's being conveyed to the Pistillum cannot be better exemplified than in that prodigy of Nature, the Valisneria.

The Valisneria is a dioicous aquatic plant, which grows very commonly in the canals and ditches about Pisa, in Italy. The female plant produces purple flowers, which stand singly on the top of a stalk, curiously twisted in the form of a screw; when the flowers are about to expand, this screw relaxes more or less according to the depth of water, and suffers the flowers to rise up to the surface where they float.

The flowers of the male plant are very numerous, small, and of a white colour; they are contained within a Spatha or sheath,

which stands on a short footstalk, that never rises to the top of the water; the flowers being arrived at maturity, they burst open the Spatha in which they are contained, detach themselves from the Receptacle to which they were fixed, and rise up to the surface of the water, where they suddenly, and with a kind of elasticity open themselves and discharge their Pollen, which being conveyed to the female flowers growing near them, impregnates the seeds contained within the Germen.

We are next to consider the effect which the Pollen has on the Stigma, or rather on the Embryo Seeds within the Germen, and all we can discover here is, that it bursts and discharges its sperm on it, and that the seeds thereby become impregnated; how this impregnation is effected we do not pretend to say, indeed while the affair of impregnation in animals is involved in so much obscurity,

we are not to expect that we shall discover more of it in vegetables.

It has been the opinion of some of the early writers on this subject, that the Pollen in substance passed through the Style, and so entered and impregnated the seeds in the Ovary; but this is a very irrational supposition, for it is not probable that the Pollen, which is nothing more than a case for the true sperm, should pass through a part which is impervious to it.

Whether the sperm itself be conveyed through the Style, is what we shall perhaps never be able with certainty to determine.

The business of impregnation being over, we find all those parts which were either more immediately or more remotely concerned in it, wither and decay; sometimes the Calyx, more generally the Corolla, the Stamina and Styles, gradually fall off; but as the Germen or Ovary, by the loss of all its coverings, would be too much ex-

posed, most commonly the Calyx remains as a covering to it; the Germen or Ovary now continues to increase, and finally produces ripe and perfect seeds; thus then from the appearance and economy of the several parts of the fructification, we are led to conclude that the Stamina and Pistilla are real sexual organs.

The hint of there being different sexes in plants seems first to have been taken from those of the Dioecia class, or such as produce the Stamina on one plant, and the Pistilla on another.

The ancients observing that several plants produced flowers which were not followed by any seed, and that other plants of the same species produced seeds without any previous flowers, or appearance of Stamina at least, readily called the one male, and the other female, without having any idea that one was assisting the other, for they considered such flowers to be only barren, and therefore they called such as produced the

Stamina female, and such as bore the fruit, male, just the reverse of what they are now found to be. Thus the female plant of the Dog's Mercury they called *Testiculata* mas and the male plant *Spicata* fœmina. Hence it is evident, that though they had some notion of different sexes, it did not, at least in some instances, arise from a true conception of them.

Their ideas of the sexes however appears better founded with respect to the Palm Tree, which seems to have confirmed this doctrine, as well as afforded the strongest proofs of its reality.

“ If the dust of a branch of the male Palm Tree,” says Aristotle, “ be suspended over the female, the fruit of the latter will quickly ripen, and (continues the same author) if the male dust be carried along by the wind, and dispersed upon the female, the same effect will follow as if a branch of the male had been suspended over it.”

“Naturalists, (says Pliny) admit of distinctions of sex not only in trees, but in herbs, and all plants; yet (continues the same author) this is no where more observable than in Palms, the females of which never propagate but when they are fecundated by the dust of the male.” Not furnished with microscopes, or accustomed to examine things with any degree of minuteness, it is no wonder that the ancients carried their discoveries no farther.

Our countryman, Dr. Grew, seems universally acknowledged to be the first who by repeated microscopic observations, discovered the use of the Pollen in the Anthera, though he candidly confesses he received the hint from Sir Thomas Middleton. He observes that the Antheræ appear to be exceedingly necessary to the plant itself, for though some may want the Calyx and others the Petals, yet there are no plants but what are furnished with some kind of Antheræ.

After ascribing to those parts some very whimsical uses, he gives it as his opinion, that the Antheræ may be considered as so many little testicles, and the Pollen contained in them as the Semen or vegetable sperm, which, falling on the Germen or Uterus of the plant, imparts some subtle, vivifying effluvia to the seed, whereby it becomes impregnated.

This opinion of Grew's was pretty generally adopted by succeeding botanists, who seemed to vie with each other in making new experiments, to ascertain more fully this new and curious doctrine of the sexes.

In some of these experiments they removed the Anthera from hermaphrodite flowers previous to their shedding of the Pollen, and found as they expected, either that no perfect seed was produced, or if apparently perfect, that it would not vegetate.

In others, after removing the Anthera, they covered the Stigma with the Pollen of

some different species, and hence produced hybrid or mule plants. In the Monoecious plants, they removed the male flowers, and in the Dioecious, they placed the males and females in such a situation, as to cut off even the most distant kind of communication betwixt them, and the same effect was produced.

The authors who chiefly distinguished themselves in this pursuit, were *Camerarius*, *Bobart*, *Morland*, *Geoffroy*, *Logan*, *Ray*, *Bradley*, *Vaillant*, and *Linnæus*. While some of these were endeavouring to establish the doctrine of the sexes by a variety of experiments, there were not wanting those who on the other hand, as strenuously endeavoured by a set of counter experiments, to destroy it. Among those, Professor Alston particularly distinguished himself; and even now, when the sexual doctrine of plants has been almost universally credited, some experiments have been lately made to invalidate it by the Abbe Spalanzani.

We may however observe that he does not attempt to overthrow the sexual doctrine generally but partially ; as many of his experiments prove the necessity of the Pollens acting on the Stigma to the production of perfect seeds capable of vegetating. The experiments he instituted were made with the Hemp plant, and from his account, appear to have been conducted with the greatest care. The result was, that female Hemp plants, without even coming within the reach of the male, produced perfect seed, and seed which vegetated. Linnæus, on the contrary asserts from similar experiments, that female Hemp plants, secluded from the effluvia of the males, produced imperfect seeds, which did not vegetate. Here the matter rests, and we shall be disposed to believe those on whose veracity we can place the greatest reliance.

To enumerate the various experiments which have been made on both sides of this important question, would lead us to trespass

too much on your time ; we shall therefore refer you to the authors before mentioned, and conclude with a modern experiment, made in favour of the sexes of plants. The experiment was made by Professor Retzius, and is as follows :

A female plant of the *Rhamnus Alaternus* flowered for eight years successively in the garden of the Academy, without producing any fruit ; the ninth year a male plant of the same species flowered, but in a greenhouse, and at a considerable distance from the female. Before he observed the latter, the flowering of both plants was nearly over ; he found however five female flowers not too far gone, which he endeavoured to impregnate by the application of the Pollen of the male flowers ; nor did the experiment fail : the female flowers produced five berries.

The next year, attending better to the time, he marked one half of the bunches of flowers on the tree, by tying round them a red

thread ; these he endeavoured to impregnate in the same manner as before ; all the flowers marked with thread produced perfect berries, with fertile seeds ; all the others not marked, fell off as soon as they had done flowering.

On the whole, from a general view of the subject, we are of opinion, that the doctrine of the sexes in plants, is supported by such incontestable arguments and unequivocal experiments, as to merit universal belief. An unexpected opportunity was afforded us last year of making an experiment with the Hemp plant, and as the result of it differed both from that of Linnæus and Spalanzani, we shall take the liberty of relating it to you.

Of several Hemp seeds sown last year in our garden, it happened that one only came up, which produced a female plant, and that a very flourishing one, growing to the height of near six feet, and branched almost to the bottom ; the branches of this plant were very thickly loaded with female flowers, which

appeared to be perfectly formed. On the most minute investigation made repeatedly while the plant was flowering, which was unusually prolonged, no male flower could be discovered, nor were there Hemp plants in its vicinity. On examining the plant when it was time to expect ripe seed, I found the German of all inspected, abortive. I could not help considering this accidental experiment as decisive in favour of the sexual doctrine; willing however to discover whether the conclusion was not too hastily formed, I had the plant taken up some time afterwards, and examined piece-meal, when to my surprize, I found eighteen ripe and perfect seeds, which being sowed in a pot, vegetated and produced plants.

No conclusion perfectly decisive can perhaps be drawn from this experiment, as I had from the largeness of the plant been deceived, in not finding the seed at the first examination; so it is possible, though highly

Fig. 1.



Fig. 3.

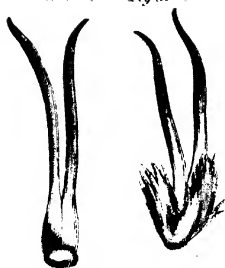


Fig. 2.



PLATE L. ✚

ON THE SEXES OF PLANTS.

Fig. 1.—Shewing the Catkins or Male Flowers on one part, and Female Flowers on another part of the same tree.

Fig. 2.—One of the Male Flowers, which are very numerous, on a single Catkin, magnified, discharging its Pollen, which is carried by the wind so profusely to every part of the tree, that the Female Flowers in all parts are impregnated therewith.

Fig. 3.—A Female Flower magnified and dissected.

Example.

Hazel.

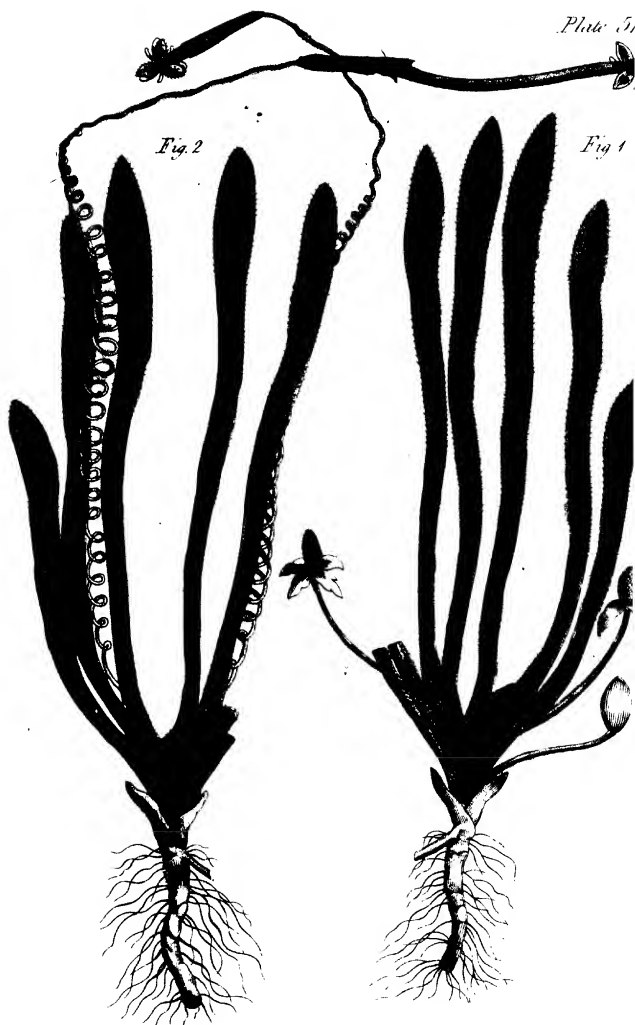


PLATE LI.

ON THE SEXES OF PLANTS.

Fig. 1.—A Male Plant of the *Valisneria*, whose flowers are small, numerous, and at first contained within a spatha or sheath; when they arrive at maturity they burst open the spatha, detach themselves from their receptacle, and rise up to the surface of the water, when they suddenly discharge their Pollen, which is conveyed to the female flowers growing near them.

Fig. 2.—A Female Plant of the *Valisneria*, whose flowers are placed at the top of a stalk, curiously twisted in the form of a screw, which, when the flowers expand, relaxes more or less, according to the depth of the water, and suffers the flower to float on the surface, where they receive the Pollen from the male flowers.

improbable, that I might be deceived in regard to the existence of a male flower, for they are very obvious.

ON
THE CLASSES
AND
ORDERS OF PLANTS.

SECTION III.

On the Classes and Orders of Plants.

AS in languages, for the more easy discovery of any particular word, Philologists have arranged their materials alphabetically, so in Plants, where the species are extremely numerous, Botanists have found it necessary to adopt some arrangement, whereby, in a general enumeration of them, any particular one may in like manner be investigated and discovered.

From the commencement of Botany as a science, various modes of arrangement have at different periods been invented, various also in their degrees of excellence; several

of these have had their respective admirers, and been partially adopted; none however have been honoured with so general a reception as that of the celebrated Linnæus.

In the last, and indeed in the early part of the present century, botanists were principally occupied in framing systems, rather than in discovering and describing species; each piquing himself on the superiority of his favourite method; but now the Linnæan System, like Aaron's rod, having swallowed up the rest, and his language having become the universal language of Botany, botanists in different parts of the world readily communicate their discoveries to each other, and instead of wasting their time in new modes of arrangement, are daily enriching the science with the discovery and description of new species.

Fortunate indeed do we consider it for the science, that one general system should thus prevail; that it may long continue must be

the fervent wish of every one who is zealous for its advancement.

Whoever has looked into the several systems which have been published, will have noticed imperfections in all of them, that of Linnæus is not exempt, but they will be found in general to arise rather from the sportings of nature, than any defect in the system itself; perfection indeed is incompatible with every mode of arrangement, for this reason, every part of a plant is liable to vary, to be inconstant; whether the system therefore be founded on the Fruit, the Corolla, the Calyx, or the Leaves, it makes little difference. It appears to us therefore a duty incumbent on every botanist, to give permanency as much as possible to the present system, by explaining it in the easiest manner, and to supply the little deficiencies to which it may be subject.

Characters of the Classes.

1 MONANDRIA; from μόνος MONOS *unicus* one, and ἀνὴρ ANER *maritus* a male.

One Stamen, in an hermaphrodite flower.

2 DIANDRIA; from δις DIS *bis* two, and ἀνὴρ ANER *maritus* a male.

Two Stamina in an hermaphrodite flower.

3 TRIANDRIA; from τρεῖς TRIES *tres* three, and ἀνὴρ ANER *maritus* a male.

Three Stamina in an hermaphrodite flower.

4 TETRANDRIA; from τέσσαρες TES-
SARES *quatuor* four, and ἀνὴρ ANER *maritus*
a male.

Four Stamina in an hermaphrodite flower.

5 PENTANDRIA; from πέντε PENTE
quinque five, and ἀνὴρ ANER *maritus* a male.

Five Stamina in an hermaphrodite flower.

6 HEXANDRIA; from ἕξ EX *sex* six,
and ἀνὴρ ANER *maritus* a male.

Six Stamina in an hermaphrodite flower.

7 HEPTANDRIA; from ἑπτά EPTA *septem*
seven, and ἀνὴρ ANER *maritus* a male.

Seven Stamina in an hermaphrodite flower.

8 OCTANDRIA; from οκτω OCTO οἶτο eight, and ἀνής ANER *maritus* a male.

Eight Stamina in an hermaphrodite flower.

9 ENNEANDRIA; from εννέα ENNEA *novem* nine, and ἀνής ANER *maritus* a male.

Nine Stamina in an hermaphrodite flower.

10 DECANDRIA; from δέκα DEKA *decem* ten, and ἀνής ANER *maritus* a male.

Ten Stamina in an hermaphrodite flower.

11 DODECANDRIA; from δωδεκα DO-DEKA *duodecim* twelve, and ἀνής ANER *maritus* a male.

Twelve to nineteen Stamina in an hermaphrodite flower.

12 ICOSANDRIA; from εἴκοσι EIKOSI *viginti* twenty, and ἀνής ANER *maritus* a male.

Stamina growing to the inside of the Calyx, not to the Receptacle.

13 POLYANDRIA; from πολὺς POLUS *multus* many, and ἀνής ANER *maritus* a male.

Having from twenty to a thousand Stamina inserted with the Pistillum into the Receptacle.

14 DIDYNAMIA; from *dis* DIS *bis* double, *δύναμις* DUNAMIS *potentia* power.

Having four Stamina; two long and two short.

15 TETRADYNAMIA; from *τέσσαρες* TESSARES *quatuor* four, and *δύναμις* DUNAMIS *potentia* power.

Having six Stamina; four long and two short.

16 MONADELPHIA; from *μόνος* MONOS *unicus* one, *ἀδελφός* ADELPHOS *frater* a brother.

The Stamina united by their filaments into one body.

17 DIADELPHIA; from *dis* DIS *bis* two and *ἀδελφός* ADELPHOS *frater* a brother.

The Stamina united by their filaments into two bodies.

18 POLYADELPHIA; from *πολύς* POLUS *multus* many, and *ἀδελφός* ADELPHOS *frater* a brother.

The Stamina united by their filaments into three or more bodies.

19 SYNGENESIA ; from σὺν SUN *simul* together, and γένεσις GENESIS *generatio* generation.

The Stamina united by their Antheræ (seldom by their Filaments) into a cylinder.

20 GYNANDRIA ; from γυνή GUNE *femina* a female, and ἀνὴρ ANER *maritus* a male.

Stamina sitting on the Pistillum, not on the Receptacle.

21 MONOECIA ; from μόνος MONOS *unicus* one, and οἰκία OIKIA *domus* a house.

Male and female flowers on the same plant.

22 DIOECIA ; from δις DIS *bis* two, and οἰκία OIKIA *domus* a house.

Male flowers produced on a separate plant from the female.

23 POLYGAMIA ; from πολὺς POLUS *multus* many, and γάμος GAMOS *nuptiæ* marriages.

Hermaphrodite or male and female flowers on the same plant.

24 CRYPTOGAMIA; from κρυπτος KRYPTOS *occultus* hidden, and γάμος GAMOS *nuptiæ* marriages.

The fructification hidden within the fruit, or produced in some unusual manner.

The ORDERS are taken from the *Pistilla* as the CLASSES are from the * *Stamina*: but those of the class *Syngenesia* differ from the rest.†

The terms *Monogynia*, *Digynia*, *Trigynia*, &c. are derived from γυνή *femina* a female, the Greek numbers μόνος *dis* &c. which signify one, two, and so on, being prefixed. In numbering the *Pistilla* we count from the bottom of the Styles: but if the Styles are wanting, the calculation is made from the number of the Stigmata.

A more particular explanation of the terms in the Orders of the Class *Syngenesia*.

I POLYGAMIA ÆQUALIS consists of

* This only takes place however in the first thirteen classes.

† As do also many of the others.

many florets or little flowers, all of which have both Stamina and a Pistillum.

It is called æqualis, or equal, because the Polygamy is equal over the whole flower.

2 POLYGAMIA SUPERFLUA: the hermaphrodite flowers in the center producing perfect seed: the female flowers likewise in the circumference producing perfect seed.

It is called superflua, or superfluous, as perfect seed is capable of being produced by the hermaphrodite flowers in the center, without the concurrence of the female flowers in the circumference.

3 POLYGAMIA FRUSTRANEA; when the hermaphrodite flowers in the center produce perfect seed; but the flowers which form the circumference produce no perfect seed.

It is therefore called frustranea, as the flowers in the circumference answer no purpose in the production of the seed.

5 POLYGAMIA NECESSARIA : when the hermaphrodite flowers in the center produce no seed ; but the female flowers which are in the circumference produce perfect seed.

It obtains the name of necessaria from the flowers in the circumference being necessary to the production of perfect seed.

5 POLYGAMIA SEGREGATA ; when the florets are furnished with partial Calyces or Cups, inclosed within one common Calyx.

It is called segregata, the florets being separated from one another by the partial Calyces.

6 POLYGAMIA MONOGAMIA contains flowers which are simple and no ways compounded : *which is implied by the term monogamia.*

THE Vegetable Kingdom is divided by Linnæus into Twenty-four Classes, each of which is founded on the number, insertion, equality, connection, situation, or absence of the Stamina, considering them at the same time as the Male Sexual Organs.

The Names of the Twenty-four Classes.

1	Monandria	
2	Diandria	
3	Triandria	
4	Tetrandria	
5	Pentandria	
6	Hexandria	Depends on Number only
7	Heptandria	
8	Octandria	
9	Enneandria	
10	Decandria	
11	Dodecandria	
12	Icosandria	} On Number and Inferion
13	Polyandria	
14	Didynamia	} On Number and Equality
15	Tetradynamia	
16	Monadelphia	} On Connection
17	Diadelphia	
18	Polyadelphia	
19	Syngenesia	
20	Gynandria	On Inferion only
21	Monoecia	} On Situation
22	Dioecia	
23	Polygamia	
24	Cryptogamia	On Absence

- 14 *Didynamia* hermaphrodite flowers having 4 Stamina, two of which are long and two short.
- 15 *Tetradynamia* hermaphrodite flowers having 6 Stamina, four long and two short.
- 16 *Monadelphica* hermaphrodite flowers having their Filaments united or connected into one body.
- 17 *Diadelphica* hermaphrodite flowers having their Filaments united into two bodies.
- 18 *Polyadelphica* hermaphrodite flowers having their Filaments united in more than two distinct fasciculi or bundles.
- 19 *Syngenesia* hermaphrodite flowers having their Antheræ united into a tube or cylinder.
- 20 *Gynandria* hermaphrodite flowers having their Stamina inserted into the Pistillum, or Receptacle lengthened out.
- 21 *Monoecia* male flowers and female flowers situated separately on the same plant.

- 22 *Dioecia* male and female flowers situated separately on two plants of the same species.
- 23 *Polygamia* hermaphrodite and male or female flowers situated on the same plant.
- 24 *Cryptogamia* no visible Stamina.

Method of investigating or finding out any particular Class.

I FIND a plant which produceth flowers with two Stamina, (we will for example suppose it to be a Veronica or Speedwell), desirous of knowing to what Class it belongs, I thus make the enquiry and reason with myself. It has very evidently two Stamina; it cannot therefore belong to the first Class *Cryptogamia*, as in that no Stamen is discoverable. I next examine if all the flowers are hermaphrodite, and finding that they are, I conclude it doth not belong to the next three Classes *Polygamia*, *Dioecia*, or *Monoecia*.

It is necessary that I now observe into what part of the flower the Stamina are inserted, and finding that they spring from the Corolla, I am certain it is not of the Class *Gynandria*, as in that they arise from the Pistillum, or from the Receptacle elongated or lengthened out. I now proceed further, and examine whether the Stamina are united either by their Antheræ or Filaments; finding that they are quite unconnected with each other, I pass by the next four Classes, *Syngenesia*, *Polyadelphia*, *Diadelphia*, and *Monadelphia*. What I am next to attend to is the number and equality of the Stamina; as this is never regarded but when there are either six or four Stamina, I pass by the next two Classes, *Tetradynamia* and *Didynamia* also. The number of the Classes in which I have now to look, is reduced to almost one half: I pursue my enquiry, and finding that there are less than twenty Stamina in my flower, and that these are not inserted either into the

Receptacle or Calyx, I rest assured of its not belonging to the Class *Polyandria* or *Icoandria*. I now have only to examine the remaining eleven Classes, in which regard is had to number only, and finding only two Stamina, rightly conclude it to be of the Class *Diandria*.

So variable is Nature in her productions, that the exact number of Stamina which should occur in a flower, will frequently be increased or diminished; hence the student should not hastily determine on a Class from a single blossom, but should form his judgment from a view of several: and it will even sometimes happen, that whilst most of the plants of the same genus are hermaphrodite, one or more species shall have the Stamina and Pistilla in distinct flowers, as in the *Lychnis Dioica*, &c. This circumstance tends much to mislead the student: but Linnæus, in his *Genera Plantarum*, to which the reader is referred, has endeavoured to remedy this inconvenience.

Observations on the Classes.

In the first eleven Classes, as far as *Dodecandria*, regard is had merely to the number of the Stamina, independent of every other circumstance, except that of their being hermaphrodite flowers: but the student should cautiously avoid the idea of all the Classes being formed on this principle, least when he takes a flower in his hand, he should expect to find the Class to which it belongs from the number of its Stamina only.

In the next two Classes, *Icosandria* and *Polyandria*, regard is had to insertion as well as number. If he finds a flower with twenty Stamina, or from that number to a thousand, with the Stamina inserted into the Calyx, it is of the Class *Icosandria*. There is a very great difference in the number of the Stamina in this Class: some of the fruit-bearing trees produce scarce twenty, while in the Rose and Pomegranate they are

far more numerous: and in the Night-blowing *Cereus* their number is scarce to be counted.

In *Polyandria* the Stamina are generally very numerous, and inserted in a regular manner around the edge of the Receptaculum or end of the stalk.

In the next two classes, *Didynamia* and *Tetradynamia*, number and equality are to be attended to: but in general, if the number be more than four or six, no regard is had to equality. The class *Didynamia* in general is easy; most of the flowers belonging to it are termed *ringentes*, as in the *Dead Nettle*, but all such flowers do not belong to this class, as *Sage*, &c. which are diandrous: nor is the inequality of the Stamina in some of the verticillate plants so perceivable as could be wished, as in the *Mints*, &c.

All the flowers of the class *Tetradynamia* are easily investigated, being a natural class, with *cruciform* or *cross-shaped flowers*.

Most of the flowers in the class *Monadelphia* show the union of the filaments pretty distinctly, as in the Mallow, but in the *Geraniums* the union of the filaments is scarcely sufficient to make them *Monadelphous*.

In the class *Diadelphia*, the form of the flower, which is the same from the Common Pea, to the smallest Trefoil, is in general a good guide to distinguish this class, which is also a natural one: and the division into two bodies, in one of which nine filaments are united, and in the other a single one, is very conspicuous in the Common Garden Pea: but in some flowers of this kind the filaments are not easily separated in this manner.

The class *Polyadelphia* fortunately contains but few flowers, as it is a difficult one, and does not distinctly retain its character. In some of the *Hypericums* the division of the filaments into three or more bundles is very

apparent, while in others it is scarce discernable.

The class *Syngenesia* is perhaps the most difficult for the student to acquire a distinct idea of, owing to the smallness of the parts and the singular coalescence or union of the *Antheræ*. I have endeavoured to make it plain; first by shewing the several different flowers of this class which most usually occur, and next by giving a magnified view of the tube formed by the union of the *Antheræ*.

The class *Gynandria* is also a difficult one, as it contains many flowers whose structure is not easily investigated by the Botanic student, particularly the *Orchis* tribe, in which the *Stamina* grow from a kind of additional part to the *Germen*. In the *Passion Flower* and *Cuckow-pint*, where they grow out of the *Receptaculum* or end of the stalk lengthened out, the character of the class is more distinctly seen.

Monœcia and *Dioœcia* are obvious enough; familiar instances occur in the Hazel and Willow.

In the class *Polygamia* many of the flowers are very minute, as in Pellitory of the Wall; the student will therefore do well to examine such plants of this class as have the parts of fructification larger, as Maple and Sycamore.

The class *Cryptogamia* contains such plants as have no visible Stamen or Pistillum: most of these nevertheless produce seed, which is contained in very minute capsules, as in the Ferns, but a late celebrated German writer, Hedwig, by uncommon dexterity of dissection, aided by glasses of a great magnifying power, has discovered that Stamina and Pistilla exist in these as in other plants. Their parts however are so extremely minute and so difficult to discover, that none but a Hedwig stands a chance of seeing them.

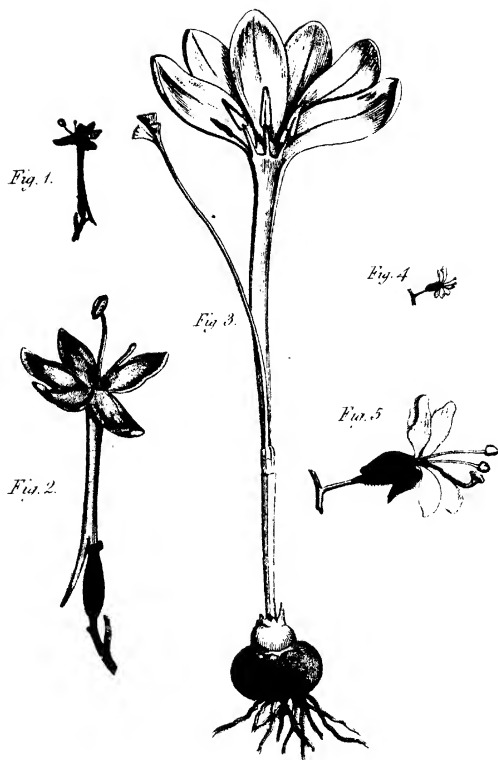


PLATE LII.

ON THE CLASSES OF PLANTS.

Fig. 1.—MONANDRIA, an Hermaphrodite flower, containing but one Stamen of its usual size.

Fig. 2.—The same magnified.

Fig. 4.—DIANDRIA, an Hermaphrodite flower, containing two Stamina of its usual size.

Fig. 5.—The same magnified.

Example.

Circæa Alpina.

Fig. 3.—TRIANDRIA, an Hermaphrodite flower, containing three Stamina.

Example.

Crocus.

Fig. 1.



Fig. 3.



Fig. 2.



Fig. 4.

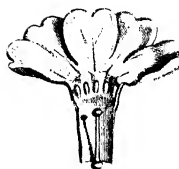


PLATE LIII.

ON THE CLASSES OF PLANTS.

Fig. 1.—TETRANDRIA, an Hermaphrodite flower, containing four Stamina.

Fig. 2.—A single floret of the same separated.

Example.

Scabious.

Fig. 3.—PENTANDRIA, an Hermaphrodite flower, containing five Stamina.

Fig. 4.—The same dissected, shewing the Stamina more plainly.

Example.

Primrose.



PLATE LIV.

ON THE CLASSES OF PLANTS.

Fig. 1.—HEXANDRIA, an Hermaphrodite flower, containing six Stamina.

Example.

Crown Imperial.



Fig. 2. HEPTANDRIA, an Hermaphrodite flower, containing seven Stamina.

Example.

Tridentalis Europæus.

Fig. 1



Fig. 2



PLATE LV.

ON THE CLASSES OF PLANTS.

Fig. 1.—OCTANDRIA, an Hermaphrodite flower, containing eight Stamina.

A Floret dissected, shewing them more plainly.

Example.

Mezerion.

Fig. 2.—ENNEANDRIA, an Hermaphrodite flower, containing nine Stamina.

Example.

Flowering Rush.



Fig. 3.



Fig. 4.



Fig. 2.



Fig. 1.

PLATE LVI.

ON THE CLASSES OF PLANTS.

Fig. 1.—DODECANDRIA, an Hermaphrodite Flower, containing twelve Stamina.

Fig. 2.—A Floret separated and dissected, shewing the Stamina more plain.

Example.
Lythrum Salicaria.

Fig. 3.—DIADELPHIA, Flowers that have their Stamina united by their Filaments into two bodies.

Fig. 4.—The Stamina separated, shewing it more plain.

Example.
Orobis Tuberosus.

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



PLATE LVII.

ON THE CLASSES OF PLANTS.

Fig. 1.—ICOSANDRIA, Plants that have more than twenty Stamina inferted into the Calyx.

Fig. 2.—The Petals removed, shewing the manner of the infertion of the Stamina.

Example.
Quince.

Fig. 3.—POLYANDRIA, Plants that have more than twenty Stamina inferted into the Receptacle.

Fig. 4.—The Petals removed, shewing the Infertion of the Stamina.

Example.
Poppy.



Fig. 1.



Fig. 2.



Fig. 3.

PLATE LVIII.

ON THE CLASSES OF PLANTS.

Fig. 1.—**DIDYNAMIA**, Plants that have four Stamina, two long and two short.

Fig. 2.—The Petal laid open to illustrate it more clearly.

Example.

Fox Glove.

Fig. 3.—**TETRADYNAMIA**, Plants having six Stamina, four long and two short.

Example.

Cardamine Pratensis.



PLATE LIX.

ON THE CLASSES OF PLANTS.

Fig. 1.—MONADELPHIA, Plants that have their Stamina united by their Filaments into one body.

Fig. 2, 3, and 4, Dissections to shew their union more plain.

Example.

Mallow.

Fig. 5.—DECANDRIA, an Hermaphrodite Flower containing ten Stamina.

Fig. 6.—The Stamina separated.

Example.

Lychnis Flos Cuculi.

Fig 1



Fig 2



Fig 4



Fig 5



PLATE LX.

ON THE CLASSES OF PLANTS.

Fig. 1.—POLYADELPHIA, Plants that have their Stamina united by their Filaments into several bodies, or Fasciculi.

Fig. 2.—The Stamina separated.

Example.

St. John's Wort.

Fig. 3.—SYNGENESIA, Plants that have their Stamina united by the Anthera into a tube.

Fig. 4 and 5, Dissections to shew it more plain.

Example.

Blue Bottle.



PLATE LXI.

ON THE CLASSES OF PLANTS.

Fig. 1.—**GYNANDRIA**, Plants that have their Stamina inserted into the Pistillum, or into an elongated Receptacle.

Fig. 2 and 3, Dissections to shew it more plain.

Example.
Orchis.

Fig. 4.—**MONOECIA**, Plants that have Male Flowers on one Part, and Female Flowers on another part of the same plant.

Fig. 5.—A Female Flower separated.

Fig. 6.—A Male Flower separated.

Example.
Carex.

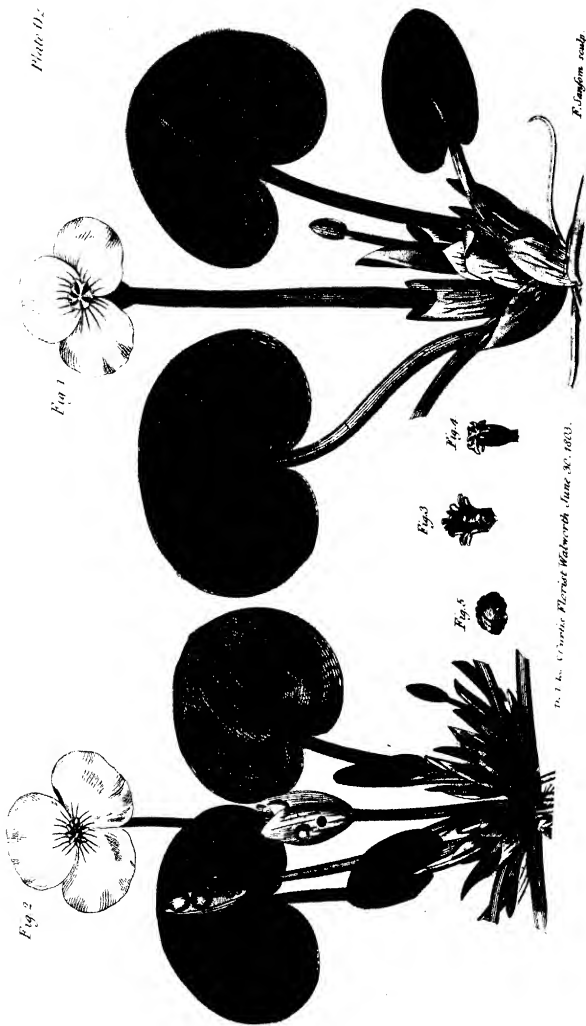


PLATE LXII.

ON THE CLASSES OF PLANTS.

Fig. 1.—DIOECIA, a Female Plant of the Frog Bit, which grows on a separate Plant from that of the Male, differing but little in appearance, but is not so profuse in its Blossoms, nor are its Stems so large as in the Male.

Fig. 2.—A Male Plant of the same.

Fig. 3.—The Filaments and Antheræ of the Male Flower, in the center of which is the rudiment only of a Germen, as in Fig. 5.

Fig. 4.—Pistillum in the Female Flower.

Example.
Frog Bit.

Fig. 1.



Fig. 4.



Fig. 2.



Fig. 3.



PLATE LXIII.

ON THE CLASSES OF PLANTS.

Fig. 1.—POLYGAMIA, Plants that have Male or Female, and Hermaphrodite Flowers on the same Plant.

Fig. 2.—Hermaphrodite Flowers separated, in which the Anthera fly back with a kind of spring, and discharge their Pollen on the Female Flowers, which are situated betwixt two Hermaphrodite ones.

Example.

Pellitory of the Wall.

Fig. 4.—CRYPTOGAMIA, Plants that have no visible Stamen or Pistillum.

Example.

Moss.



The Orders which depend on Characters distinct from those of the Classes.

Monogynia	Siliquosa
Digynia	Polygamia æqualis
Trigynia	Polygamia superflua
Tetragynia	Polygamia necessaria
Pentagynia	Polygamia frustranea
Hexagynia	Polygamia segregata
Heptagynia	Polygamia monogamia
Decagynia	Trioecia
Dodecagynia	Filices
Polygynia	Musci
Gymnospermia	Algæ
Angiospermia	Fungi
Siliculosa	

N. B. Many of the Orders take the character of the Classes, as in *Monadelpbia Polyandria*, &c. here the Order is founded on the same principle as that of the Class *Polyandria*; it was therefore thought unnecessary to give a figure of such Orders; for whoever understands the principles on which the Classes are founded, cannot fail of understanding the Orders also.

The Ordines or Orders explained and illustrated by Examples, most of which are taken from common English Plants.

N. B. Such as have an Asterisk before them are Foreign.

CLASS I. MONANDRIA, contains two Orders.

1 *Monogynia* having one Pistillum.

EXAMPLE—*Salicornia*, Jointed Glass-wort.

2 *Digynia* two Pistilla.

Ex.—*Cailitriche*, Star-headed Water Chickweed.—* *Blitum*, Strawberry Spinage.

CLASS II. DIANDRIA, contains three Orders.

1 *Monogynia* having one Pistillum.

Ex.—*Ligustrum*, Privet. *Veronica*, Speedwell.

2 *Digynia* two Pistilla.

Ex. — *Anthoxanthum Odoratum*, Sweet-scented Vernal-Grass.

3 *Trigynia* three Pistilla.

Ex.—* *Piper*, Pepper.

CLASS III. TRIANDRIA, contains three Orders.

1 *Monogynia* having one Pistillum.

Ex.—*Valeriana*, Valerian. *Crocus*, Saffron.

2 *Digynia* two Pistilla.

Ex.—*Gramina pleraque*, most of the Grasses

3 *Trigynia* three Pistilla.

Ex.—*Montia*, Water Chickweed or Blinks.

CLASS IV. TETRANDRIA, contains three Orders.

1 *Monogynia* having one Pistillum.

Ex.—*Dipsacus*, Teasel. *Scabiosa*, Scabious.

2 *Digynia* two Pistilla.

Ex.—*Aphanes*, Parsley-piert.

3 *Tetragynia* four Pistilla.

Ex.—*Potamogeton*, Pond-weed.

CLASS V. PENTANDRIA, contains six Orders.

1 *Monogynia* having one Pistillum.

Ex.—*Primula*, Primrose.

2 *Digynia* two Pistilla.

Ex.—*Cbironia Centaurium*, Centaury.

3 *Trigynia* three Pistilla.

Ex.—*Viburnum*, Wayfaring Tree.

4 *Tetragynia* four Pistilla.

Ex.—*Parnassia*, Grass of Parnassus.

5 *Pentagynia* five Pistilla.

Ex.—*Statice*, Thrift. *Linum*, Flax.

6 *Polygynia*, many Pistilla.

Ex.—*Myosurus*, Mouse-tail.

CLASS VI. HEXANDRIA, contains five Orders.

1 *Monogynia* having one Pistillum.

Ex.—*Hyacinthus*, Hyacinth.

2 *Digynia* two Pistilla.

Ex.—* *Oryza*, Rice.

CLASSES AND ORDERS OF PLANTS.

3 *Trigynia* three Pistilla.

Ex.—*Rumex*, Dock.

4 *Tetragynia* four Pistilla.

Ex.—* *Petiveria*, Guinea Hen Weed.

5 *Polygynia* many Pistilla.

Ex.—*Alisma*, Water Plantain.

CLASS VII. HEPTANDRIA, contains four Orders.

1 *Monogynia* having one Pistillum.

Ex.—*Trientalis*, Chickweed-Winter Green.

2 *Digynia* two Pistilla.

Ex.—* *Limeum*.

3 *Trigynia* three Pistilla.

Ex.—* *Saururus*, Lizard's-tail.

4 *Heptagynia* seven Pistilla.

Ex.—* *Septas*.

CLASS VIII. OCTANDRIA, contains four
Orders.

1 *Monogynia* having one Pistillum.

Ex.—*Epilobium*, Willow-Herb.

2 *Digynia* two Pistilla.

Ex.—* *Galenia*. * *Weinmannia*, Mountain
Chickweed.

3 *Trigynia* three Pistilla.

Ex.—*Polygonum*, Bistort. *Perficaria*.

4 *Tetragynia* four Pistilla.

Ex.—*Paris*, Herb Paris.

CLASS IX. ENNEANDRIA, contains three
Orders.

1 *Monogynia* having one Pistillum.

Ex.—* *Laurus*, Bay, Saffafras.

2 *Trigynia* three Pistilla.

Ex.—* *Rheum*, Rhubarb.

3 *Hexagynia* six Pistilla.

Ex.—*Butomus*, Flowering Rush.

CLASS X. DECANDRIA, contains five Orders.

1 *Monogynia* having one Pistillum.

Ex.—*Arbutus*, Strawberry Tree. **Ruta*, Rue.

2 *Digynia* two Pistilla.

Ex.—*Saxifraga*, Saxifrage. *Dianthus*, Pink.

3 *Trigynia* three Pistilla.

Ex.—*Cucubalus*, Spatling Poppy.

4 *Pentagynia* five Pistilla.

Ex.—*Sedum*, Stonecrop.

5 *Decagynia* ten Pistilla.

Ex.—* *Bafella*, American Nightshade.

CLASS XI. DODECANDRIA, contains six Orders.

1 *Monogynia* having one Pistillum.

Ex.—*Afarum*, Afarabacca.

2 *Digynia* two Pistilla.

Ex.—*Agrimonia*, Agrimony.

3 *Trigynia* three Pistilla.

Ex.—*Refeda*, Dyer's Weed.

4 *Pentagynia* five Pistilla.

Ex.—* *Glinus*.

5 *Dodecagynia* twelve Pistilla.

Ex.—*Sempervivum* Houseleek.

6 *Polygynia* many Pistilla.

Ex.—* *Alisma Cordifolia*.

CLASS XII. ICOSANDRIA, contains five
Orders.

1 *Monogynia* having one Pistillum.

Ex.—*Prunus*, Black Thorn.

2 *Digynia* two Pistilla.

Ex.—*Cratægus*, Hawthorn.

3 *Trigynia* three Pistilla.

Ex.—*Sorbus*, Mountain Ash.

4 *Pentagynia* five Pistilla.

Ex.—*Mespilus*, Medlar.

5 *Polygynia* many Pistilla.

Ex.—*Rosa*, Rose. *Rubus*, Bramble.

CLASS XIII. POLYANDRIA, contains seven Orders.

1 *Monogynia* having one Pistillum.

Ex.—*Papaver*, Poppy.

2 *Digynia* two Pistilla.

Ex.—**Fothergilla*. **Pæonia*, Piony.

3 *Trigynia* three Pistilla.

Ex.—*Delphinium*, Larkspur.

4 *Tetragynia* four Pistilla.

Ex.—**Cimicifuga*. **Tretacera*.

5 *Pentagynia* five Pistilla.

Ex.—*Aquilegia*, Columbine.

6 *Hexagynia* six Pistilla.

Ex.—*Stratiotes*, Fresh-water Soldier.

7 *Polyginia* many Pistilla.

Ex.—*Adonis*, Pheasant's Eye.

CLASS XIV. DIDYNAMIA, contains two Orders.

1 *Gymnospermia* Seeds contained in the bottom of the Calyx.

Ex.—*Glechoma*, Ground-Ivy. *Lamium*, Dead-Nettle. *Melissa*, Baum.

2 *Angiospermia* Seeds contained in a Pericarpium.

Ex.—*Antirrhinum*, Snapdragon. *Digitalis*, Fox-Glove. *Scrophularia*, Water Betony.

CLASS XV. TETRADYNAMIA, contains
two Orders.

1 *Siliquosa*, Seeds in a small short, or round pod.

Ex.—*Draba*, Witlow-Grafs. *Hesperis*, Honesty. *Thlaspi*, Shepherd's Purse.

2 *Siliquosa* Seeds in a long slender pod.

Ex.—*Cheiranthus*, Wall-Flower. *Brassica*, Cabbage. *Sinapis*, Mustard.

CLASS XVI. MONADELPHIA, contains
five Orders.

1 *Pentandria* having five Stamina.

Ex.—* *Hermannia*.

2 *Decandria* ten Stamina.

Ex.—*Geranium*, Crane's-bill.

3 *Eneandria* eleven Stamina.

Ex.—* *Brownea*.

4 *Dodecandria* twelve Stamina.

Ex.—* *Pentapetes*.

5 *Polyandria* many Stamina.

Ex.—*Malva*, Mallow.

CLASS XVII. DIADELPHIA, contains four Orders.

1 *Pentandria* having five Stamina.

Ex.—* *Monniera*.

2 *Hexandria* six Stamina.

Ex.—*Fumaria*, Fumitory.

3 *Octandria* eight Stamina.

Ex.—*Polygala*, Milk-wort.

4 *Decandria* ten Stamina.

Ex.—*Pisum*, Pea. *Ulex*, Furze.

CLASS XVIII. POLYADELPHIA, contains four
Orders.

1 *Pentandria*, having five Stamina.

Ex.—* *Theobroma*.

2 *Dodecandria* twelve Stamina.

Ex.—* *Monsonia*.

3 *Icofandria* twenty Stamina.

Ex.—* *Citrus*, Orange.

4 *Polyandria* many Stamina.

Ex.—*Hypericum*, St. John's Wort.

CLASS XIX. SYNGENESIA, contains six
Orders.

1 *Polygamia æqualis*, when all the flosculi
or florets, are hermaphrodite.

Ex.—*Leontodon*, Dandelion. *Sonchus*, Sow-
Thistle. *Hieracium*, Hawkweed. *Carduus*,
Common Thistle.

2 *Polygamia superflua*, when the florets in the center are hermaphrodite, and those in the circumference female.

Ex.—*Anthemis*, Mayweed. *Bellis*, Daisy. *Senecio*, Groundsel. *Chrysanthemum*, Ox-eye Daisy. *Tussilago*, Coltsfoot. *Inula*, Elecampane.

3 *Polygamia frustranea*, when the florets in the center are hermaphrodite, and those in the circumference barren.

Ex. — *Centaurea*, Blue-bottle, Knapweed.

* *Helianthus*, Sunflower. * *Rudbeckia*.

4 *Polygamia necessaria*, when the hermaphrodite florets in the center produce no seed, but the female florets in the circumference produce perfect seed.

Ex. — * *Calendula*, Marigold. * *Silphium*.

Gnaphalium, Cudweed. * *Arctotis*.

5 *Polygamia segregata*, many partial flower cups or calyces, within a common calyx, separating the flosculi or florets.

Ex.—* *Echinops*, Globe Thistle. * *Gundelia*.
 * *Stoebe*. * *Oedera*. * *Spheranthus*.

6 *Polygamia Monogamia* contains simple flowers, which have their Antheræ united.

Ex. — *Viola*, Violet. *Impatiens*, Touch-me-not, * *Balsam*. * *Lobelia*, Cardinal Flower.

CLASS XX. GYNANDRIA, contains eight Orders.

1 *Diandria*, having two Stamina.

Ex.—*Orchis*. *Cypripedium*, Ladies Slipper.

2 *Triandria*, three Stamina.

Ex.—* *Sisyrinchium*. * *Ferraria*.

3 *Tetrandria*, four Stamina.

Ex.—* *Nepenthes*.

4 *Pentandria*, five Stamina.

Ex.—* *Passiflora*, Passion Flower. * *Gluta*.

5 *Hexandria*, six Stamina.

Ex.—* *Aristolochia*. Birth-wort. * *Pistia*.

6 *Decandria*, ten Stamina.

Ex.—* *Kleinbovia*. * *Helicteres*, Screw Tree.

7 *Dodecandria*, twelve Stamina.

Ex.—* *Cytinus*.

8 *Polyandria*, many Stamina.

Ex.—*Arum*, Cuckow-pint, * *Dragons*.

CLASS XXI. MONOECIA, contains eleven
Orders.

1 *Monandria*, having one Stamen.

Ex.—*Chara*. *Zannichellia*, Horned Pond-weed. * *Elatariam*, Wild Cucumbér.

2 *Diandria*, two Stamina.

Ex.—*Lemna*, Duckmeat. * *Anguria*.

3 *Triandria*, three Stamina.

Ex.—*Sparganium*. Burr-Reed. *Typha*, Cat's-tail. *Carex*.

4 *Tetrandria*, four Stamina.

Ex.—*Urtica*, Nettle. * *Morus*, Mulberry.

Buxus, Box. *Betula*, Birch.

5 *Pentandria*, five Stamina.

Ex.—*Xanthium*, Lesser Burdock. * *Amaranthus*, Amaranth.

6 *Hexandria*, six Stamina.

Ex.—* *Zizania*. * *Pharus*.

7 *Heptandria*, seven Stamina.

Ex.—* *Guettarda*.

8 *Polyandria*, many Stamina.

Ex.—*Fagus*, Beech. *Sagittaria*, Arrow-head. *Corylus*, Hazel. *Quercus*, Oak.

9 *Monadelphica*, Filaments united.

Ex.—*Pinus*, Fir. * *Hura*, Sand-box Tree.

* *Thuja*, Arbor Vitæ. * *Cupressus*, Cypress. * *Ricinus*, Palma Christi.

10 *Syngenesia*, Antheræ united.

Ex.—* *Cucumis*, Cucumber. * *Trichosanthes*, Serpent Cucumber. * *Cucurbita*, Gourd. *Momordica*, Male Balsam Apple.

11 *Gynandria*, Stamina growing out of the Pistillum.

Ex.—*Andrachne*, Bastard Orpine. * *Agyneja*.

CLASS XXII. DIOECIA, contains fourteen
Orders.

1 *Monandria*, having one Stamen.

Ex.—* *Najas*.

2 *Diandria*, two Stamina.

Ex.—*Salix*, Willow. * *Vallisneria*.

3 *Triandria*, three Stamina.

Ex.—*Empetrum*, Crow-Berries. * *Osyris*,
Poets Caffia.

4 *Tetrandria*, four Stamina.

Ex.—*Hippophaë*, Sea Buckthorn. * *Viscum*,
Mistletoe. *Myrica*, Gale.

5 *Pentandria*, five Stamina.

Ex.—* *Cannabis*, Hemp. *Humulus*, Hop.
* *Spinachia*, Spinach. * *Pistachia*, Pistachia
Nut.

6 *Hexandria*, six Stamina.

Ex. — *Tamus*. Black Bryony. * *Smilax*,
Rough Bindweed. * *Dioscorea*. Yam.

7 *Octandria*, eight Stamina.

Ex.—*Populus*, Poplar. *Rhodiola*, Rose-root.

8 *Enneandria*, nine Stamina.

Ex.—*Mercurialis*, Mercury. *Hydrocharis*, Frogbit.

9 *Decandria*, ten Stamina.

Ex.—* *Carica*, Papaw. * *Schinus*, Indian Mastic.

10 *Dodecandria*, twelve Stamina.

Ex.—* *Menispermum*, Moon-Seed. * *Datisca*, Bastard Hemp.

11 *Polyadelphia*, many Stamina.

Ex.—* *Cliffortia*.

12 *Monadelphia*, Filaments united.

Ex. — *Juniperus*, Juniper. *Taxus*, Yew.
* *Ephedra*, Shrubby Horsetail.

13 *Syngenesia*, Antheræ united.

Ex.—*Ruscus*, Butchers Broom.

14 *Gynandria*, Stamina growing out of the Pistillum.

Ex.—* *Clusia*.

CLASS XXIII. POLYGAMIA, contains three Orders.

1 *Monoecia*, Hermaphrodite, and male or female flowers on the same plant.

Ex.—*Valantia*. Cross-wort. *Acer*, Maple.
Parietaria, Pellitory of the Wall. *Atriplex*, Orach.

2 *Dioecia*, Hermaphrodite, and male or female flowers on separate plants.

Ex. — *Fraxinus*, Ash. * *Diospyrus*, Date-Plum. * *Pisonia*, * *Gleditsia*, Threethorned Acacia.

3 *Trioecia*, Hermaphrodite, male, and female flowers, growing separately on three distinct plants of the same species.

Ex.—* *Ceratonia*, Carob Tree. * *Ficus*, Fig Tree.

CLASS XXIV. CRYPTOGRAMIA contains four Orders.

1 *Filices*, comprehending the *Filices*, Ferns.

Ex.—*Ophioglossum*, Adders-Tongue. *Equisetum*, Horsetail. *Polypodium*, Polypody. *Pilularia*, Pepper-Grafs, &c.

2 *Musci*, comprehending the *Musci*, Mosses of different kinds.

3 *Algæ*, including the *Fucus*, Sea Weed. *Lichen*, Liverwort. *Jungermannia*, &c.

4 *Fungi*, containing the *Agaricus*, Mushroom. *Lycoperdon*, Puff-Ball: and other Plants of that Tribe.

Observations on some of the Orders.

AS we thought it necessary to caution the Student against entertaining an idea of all the Classes being formed on the *number of the Stamina* merely, so he should be no less on his guard against entertaining a notion of all the Orders being taken from the *number of the Pistilla*, as it is only the Orders of the *first ten Classes* which are formed from this circumstance, and those are so obvious, that the Student will find no difficulty in acquiring a knowledge of them.

The next two Orders, *Gymnospermia* and *Angiospermia*, are too plain to need any elucidation.

The Orders in the Classes *Siliculosa* and *Siliquosa*, are taken from the shape of the Seed-vessels. Those in the Order *Siliculosa* are very apt to vary in their form; sometimes being nearly triangular, as in *Shepherd's*

Purse; oval, as in *Whitlow Grass*; or spherical, as in *Alyssum*.

The Orders in the Class *Syngenesia*, will be clearly understood, by a reference to the Plates.

The last Order of this Class *Monogamia*, has been considered by most Botanists as a kind of absurdity in terms: and it must be allowed, that the Antheræ in many other flowers, not brought by LINNÆUS into this Class, are as much united into a *tube*, particularly the *Nightshades*.

The Class *Cryptogamia*, containing such Plants as have no visible Stamina or Pistilla, contains four Orders, viz. the *Filices*, *Musci*, *Algæ*, and *Fungi*. The Filices or Ferns have their parts of Fructification placed on the back of their leaves, either in round dots, as in *Polypodium*, or in lines, as in *Asplenium*. If we examine these dots or lines with a good magnifier, we find them composed of a great number of Capsules or Seed-

vessels, containing a prodigious number of very minute seeds: each Capsule is furnished with an elastic ring, which when the Capsule is arrived at maturity, bursts it open with a considerable force, and scatters the seed to a distance.

The *Musci*, or *Mosses*, for the most part, produce their Seed in little Capsules, placed at the end of a footstalk; their Capsules are at first covered with a kind of membranous cap, called the Calyptra, which as the Capsule swells, bursts on one side, and, in most Mosses, soon falls off. The mouth of the Capsule is furnished with an Operculum, or Cover, which sometimes falls off with the Calyptra, and sometimes remains long after it; on removing the Operculum we find the mouth of the Capsule in many of the Mosses furnished with a row of pointed teeth, converging to a point, and which are of various forms in many of the Mosses, these are termed

Cilia, their presence, absence, and peculiarity of structure, form very good characters to distinguish the Genera and Species.

The third Order, the *Alga*, contains the Sea-Weeds, Liver-Worts, &c. whose Fructifications are but little known.

The fourth Order includes the *Fungi*, or *Mushrooms* of various kinds; these have been classed by some writers with the animal kingdom, but very erroneously, for it is well known that they produce seed, from which they may be raised like other plants. And the celebrated Hedwig, by great dexterity of dissection, and by using microscopes of very highly magnifying powers, assures us that he has discovered both Stamina and Pistilla, not only in this order of Plants, but in the three others.

Fig 1



Fig 2

PLATE LXIV.

ON THE ORDERS OF PLANTS.

Fig. 1.—MONOGYNIA, an Hermaphrodite Flower, containing one Pistillum.

Example.
Honeyfuckle.

Fig. 1

Plate (6.)



PLATE LXV.

ON THE ORDERS OF PLANTS.

Fig. 1.—DIGYNIA, an Hermaphrodite Flower, containing two Pistilla.

Fig. 2.—The Pistilla separated.

Example.

Sopewort.

Fig. 3.—TRIGYNIA, an Hermaphrodite Flower, containing three Pistilla.

Fig. 4.—The Pistilla separated of their natural size.

Fig. 5.—The same magnified.

Example.

Greater Stichwort.

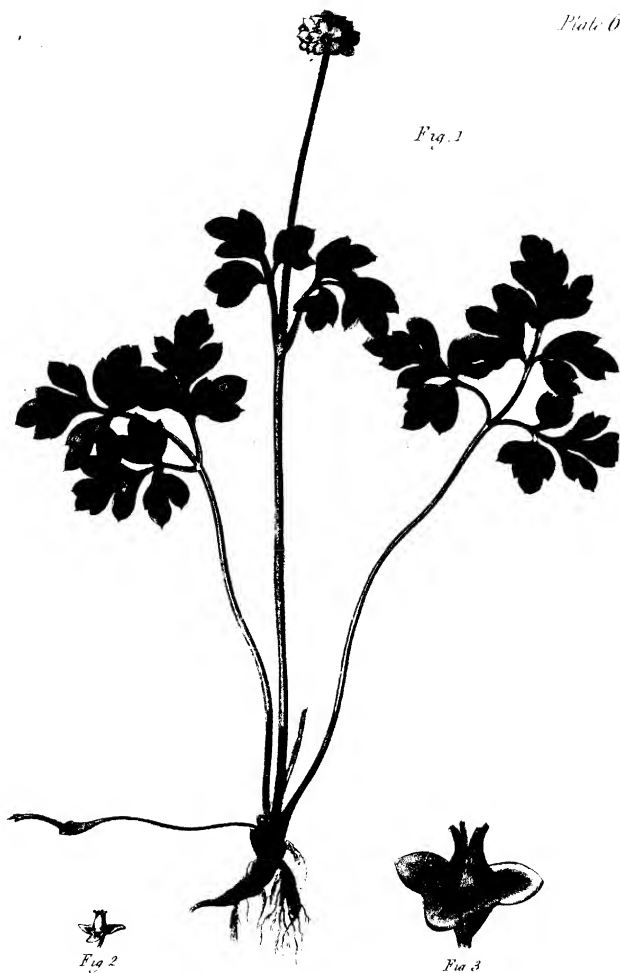


Fig 2

Fig 3

PLATE LXVI.

ON THE ORDERS OF PLANTS.

Fig. 1.—TETRAGYNIA, an Hermaphrodite Flower, containing four Pistilla.

Fig. 2.—The Pistilla separated of the natural size.

Fig. 3.—The Pistilla magnified.

Example.

Adoxa Moschatellina.

Fig. 1.



Fig. 2.



Fig. 3



PLATE LXVII.

ON THE ORDERS OF PLANTS.

Fig. 1.—PENTAGYNIA, an Hermaphrodite Flower, containing five Pistilla.

Fig. 2.—Parts of Fructification separated.

Fig. 3.—The Germen rather grooved, Stigmata simple.

Example.

Mouse-Ear Chickweed.

Fig 1.



Fig 2



PLATE LXVIII.

ON THE ORDERS OF PLANTS.

Fig. 1.—HEXAGYNIA, an Hermaphrodite Flower, containing Six Pistilla.

Fig. 2.—The Pistilla separated.

Example.

Flowering Rush.

Fig. 1.

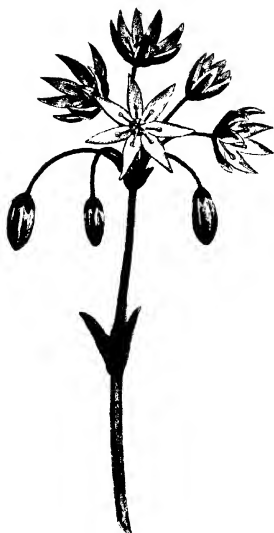


Fig 2.



PLATE LXIX.

ON THE ORDERS OF PLANTS.

Fig. 1.—HEPTAGYNIA, an Hermaphrodite Flower, containing seven Pistilla.

Example.

Septas Capensis.

Fig 1



Fig 2



PLATE LXX.

ON THE ORDERS OF PLANTS.

Fig. 1.—DECAGYNIA, an Hermaphrodite Flower, containing ten Pistilla.

Example.
Phytolacca.

Fig. 1



PLATE LXXI.

ON THE ORDERS OF PLANTS.

Fig. 1.—DODECAGYNIA, an Hermaphrodite Flower, containing twelve Pistilla.

Example.

Houfeleek.

Fig 1



PLATE LXXII.

ON THE ORDERS OF PLANTS.

Fig. 1.—POLYGYNIA, an Hermaphrodite Flower, containing many Pistilla.

Example.

Pheasant's Eye.

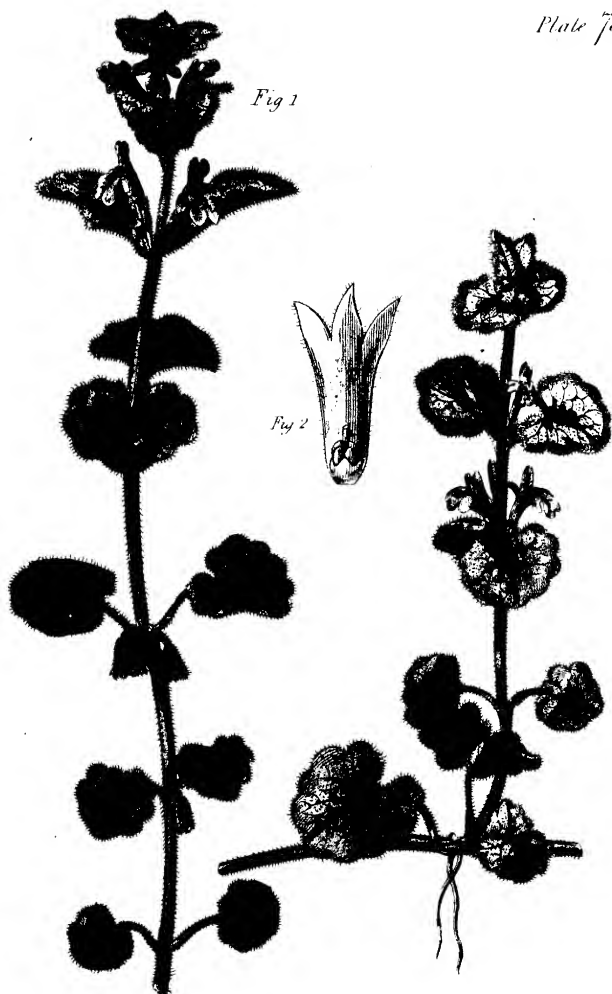


PLATE LXXIII.

ON THE ORDERS OF PLANTS.

Fig. 1.—GYMNOSPERMIA, Plants whose Seeds are contained in the Bottom of a Calyx.

Fig. 2.—The Calyx opened, shewing it more plain, being magnified.

Example.
Ground Ivy.

Fig. 1.



Fig. 2.



PLATE LXXIV.

ON THE ORDERS OF PLANTS.

Fig. 1.—ANGIOSPERMIA, such Plants of the Class DIDY-
NAMIA, as produce their Seed in a Pericarpium.

Example.

Yellow Toad Flax.



PLATE LXXV.

ON THE ORDERS OF PLANTS.

Fig. 1.—*SILICULOSA*, the first Order in the Class *TETRA-DYNAMIA*, containing those Plants in that Class which produce their Seeds in a small, short, or round pod.

Fig. 2.—A ripe Seed-vessel, cut in the middle, shewing the Seeds.

Fig. 3. — An unripe Seed-vessel, containing the parts of Fructification magnified.

Fig. 4.—A ripe Seed-vessel of the common size.

Example.

Penny-Cress.

Fig 1



Fig 2

PLATE LXXVI.

ON THE ORDERS OF PLANTS.

Fig. 1.—**SILIQUOSA**, the second Order in the Class **TETRA-DYNAMIA**, containing such Plants in that Class which produce their Seeds in long slender pods.

Fig. 2.—A ripe Seed-veffel.

Example.

Wild Radish.



Fig. 2.



PLATE LXXVII.

ON THE ORDERS OF PLANTS.

Fig. 1.—*POLYGAMIA ÆQUALIS*, consisting of many Florets or little Flowers, all of which have both Stamina and a Pistillum; it is called *Æqualis*, or equal, because the Polygamy is equal over the whole Flower.

Fig. 2.—One of the florets separated of which the whole is composed.

Example.

Blue Succory.

Fig. 1



Fig. 2.



PLATE LXXVII.

ON THE ORDERS OF PLANTS.

Fig. 1.—POLYGAMIA *ÆQUALIS*, consisting of many Florets or little Flowers, all of which have both Stamina and a Pistillum; it is called *Æqualis*, or equal, because the Polygamy is equal over the whole Flower.

Fig. 2.—One of the florets separated of which the whole is composed.

Example.

Blue Succory.



PLATE LXXVIII.

ON THE ORDERS O.

Fig. 1. — POLYGAMIA SUPERFLUA, the Hermaphrodite Flowers in the center producing perfect seed; the Female Flowers in the circumference producing perfect seed also; it is called Superflua or Superfluous, as perfect seed is capable of being produced by the Hermaphrodite Flowers in the center, without the concurrence of the Female Flowers in the circumference.

Fig. 2.—An Hermaphrodite Flower in the center separated.

Fig. 3.—One of the Female Flowers from the circumference separated.

Example.

Daify.

Fig. 1.



PLATE LXXIX.

ON THE ORDERS OF PLANTS.

Fig. 1.—POLYGAMIA NECESSARIA, when the Hermaphrodite Flowers in the center produce no seed; but the female Flowers in the circumference produce perfect seed: it obtains the name of Necessaria from the Flowers in the circumference being necessary to the production of perfect seed.

Example.
Silphium.



PLATE LXXX.

ON THE ORDERS OF PLANTS.

Fig. 1.—POLYGAMIA FRUSTRANEA, when the Hermaphrodite Flowers in the center produce perfect seed ; but the flowers which form the circumference produce no perfect seed, it is therefore called Frustranea, as the Flowers in the circumference answer no purpose in the production of the seed.

Example.

Rudbekia.



Fig 1



Fig 2

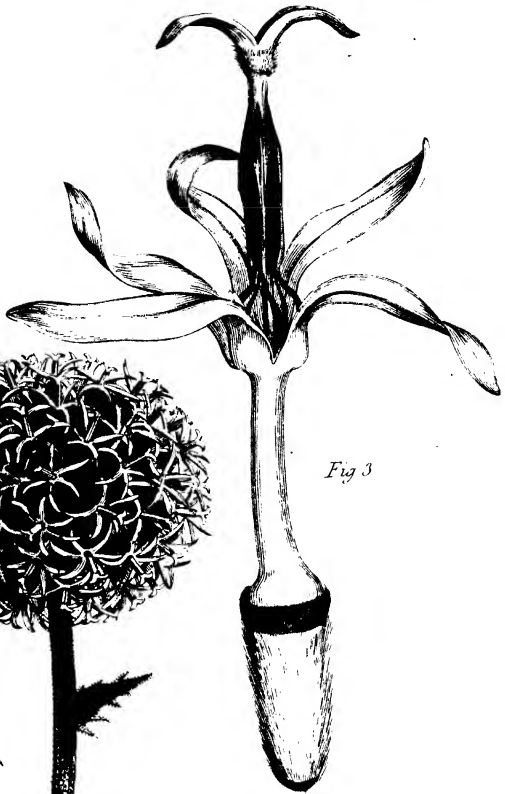


Fig 3

PLATE LXXXI.

ON THE ORDERS OF PLANTS.

Fig. 1.—POLYGAMIA SEGREGATA, when the Florets are furnished with partial Calyces, or Cups, inclosed within one common Calyx, at least forming what is termed one Flower; it is called Segregata, the Florets being separated from one another by the partial Calyces.

Fig. 2.—One of the Florets separated of its natural size.

Fig. 3.—The Floret largely magnified, and stript of its Calyx.

Example.

Globe Thistle.

Fig. 1.



Fig. 2.



Fig. 3.



P L A T E LXXXII.

ON THE ORDERS OF PLANTS.

Fig. 1.—POLYGAMIA MONOGAMIA contains Flowers which are simple and no ways compounded, having their Antheræ united.

Fig. 2 and 3.—Dissections, to shew the union of the Antheræ more plain.

Example.

Lobelia Urens.

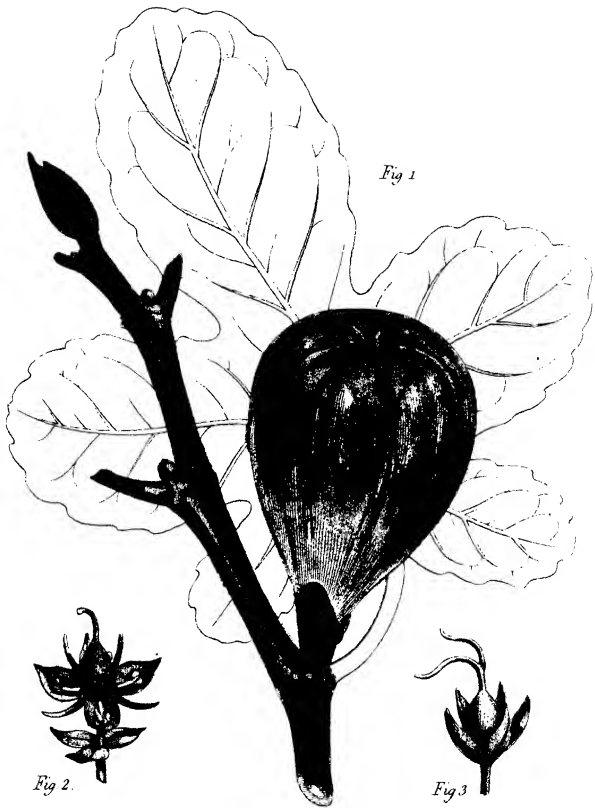


PLATE LXXXIII.

ON THE ORDERS OF PLANTS.

Fig. 1.—TRIOECIA, having Hermaphrodite, Male, and Female Flowers, growing separately on three distinct plants of the same species.

Fig. 2 and 3.—Dissections, shewing it more plain.

Example.

Fig.

Fig 1

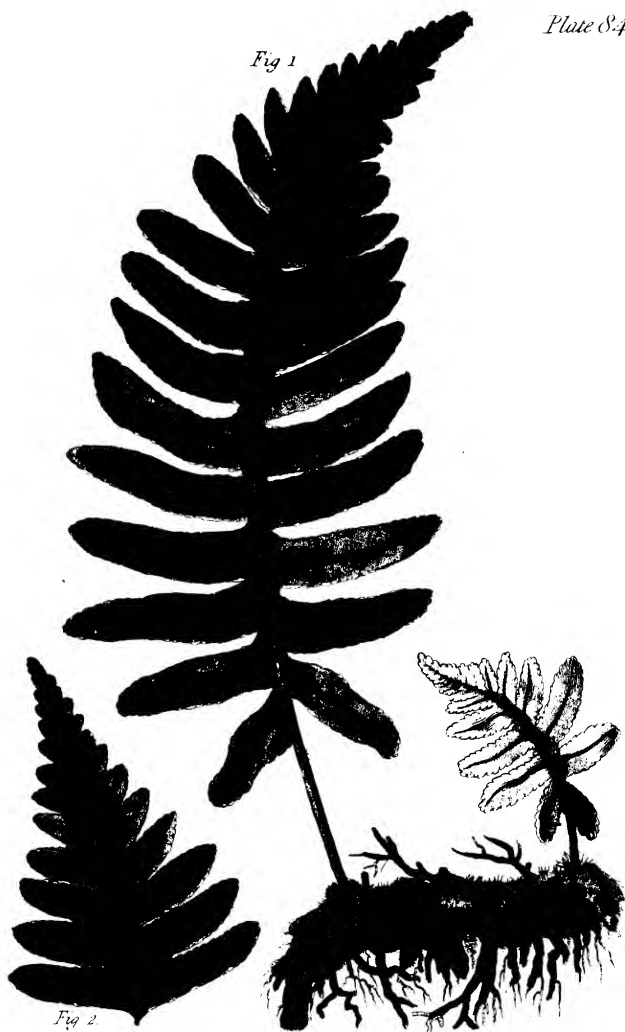


Fig 2

Ad Edwards. Pub by S Curtis Florist Walworth Newmarket. Plantform copy

PLATE LXXXIV.

ON THE ORDERS OF PLANTS.

Fig. 1.—FILICES, one of the four Orders in CRYPTOGRAMIA, whose parts of FruCtification are so minute as not to be easily dissected.

Fig. 2.—Part of the back of the Leaf, shewing the Flowers or parts of FruCtification, like yellow dots, of their natural size.

Example.

Polypodium.

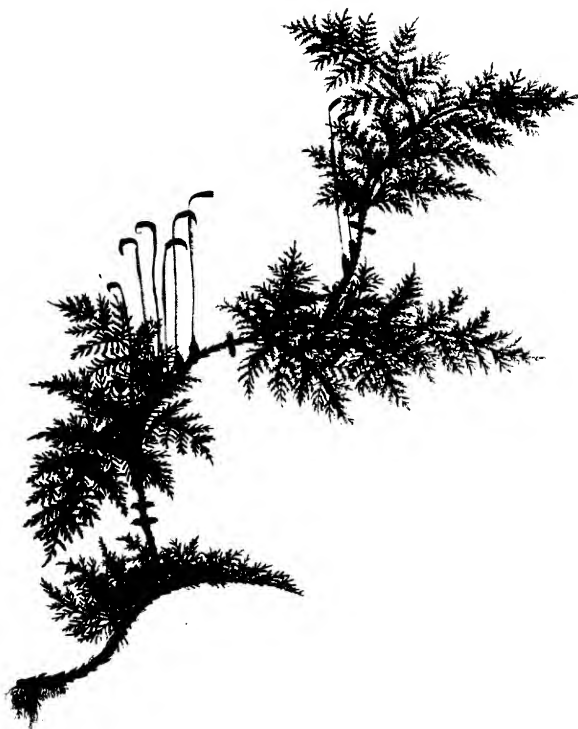


PLATE LXXXV.

ON THE ORDERS OF PLANTS.

Fig. 1.—MUSCI, one of the four Orders of CRYPTOGRAMIA, containing the Bryums, Hypnums, and Mosses of all kinds.

Example.

Hypnum Proliferum.

Fig. 1



PLATE LXXXVI.

ON THE ORDERS OF PLANTS.

Fig. 1.—ALGÆ, one of the four Orders in CRYPTOGRAMIA, including the Sea Weeds and Liver-Worts. A Plant of the *Jungermania*, of its natural size, shewing its mode of flowering.

Fig. 2.—A part of the same magnified.

Fig. 3.—The underfide of the same magnified.

Example.

Jungermania.

Fig 1.



Fig 2



Fig 3



PLATE LXXXVII.

ON THE ORDERS OF PLANTS.

Fig. 1.—FUNGI, one of the four Orders in CRYPTOGRAMIA, including the Mushrooms, Puff-balls, &c. shewing the underside or gills of the Plant.

Fig. 2 and 3.—The same Plant in different positions, shewing the dark brown on the upper side of the Annulus or Ruffle, and its light colour underneath.

Example.

Verdigris Mushroom.

Fig 2



Fig 3



Fig 1



Fig 4



Fig 5



PLATE LXXXVIII.

ON CRYPTOGAMIA.

Fig. 1.—Part of a Leaf of the Asplenium, with its Parts of Fructification in their natural size, colour, and appearance.

Fig. 2.—A single Capsule separated, perfectly closed.

Fig. 3.—The same, beginning to open.

Fig. 4.—The same, more opened, shewing the elastic ring which each separate Capsule contains, and which, flying back as at Fig. 5. discharges the seed.

Example.

Hart's-Tongue.

Fig 1



Fig 5



Fig 6

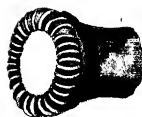


Fig 4

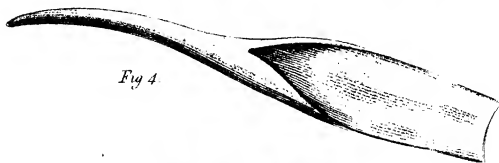


Fig 7

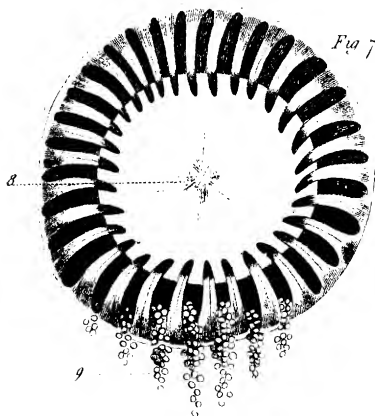


PLATE LXXXIX.

ON CRYPTOGRAMIA.

Fig. 1.—A Capsule of the *Bryum Undulatum*, highly magnified, with its Operculum, 2, and Calyptra, 3.

Fig. 4.—The Calyptra separated.

Fig. 5.—The Operculum taken off.

Fig. 6.—The mouth of the Ciliæ, which is defended by the Operculum, until the Capsule is ripe, when that dropping off, the fine powder, or seed (which it appears to be), is discharged through the interstices.

Fig. 7.—An exceeding large magnified Figure, of the front of the mouth of the same Capsule discharging its seed.—

8. The solid piece, closing the greatest part of the mouth.

—9. The seed falling through the interstices between



PLATE XC.

ON CRYPTOGAMIA.

Fig. 1.—A Capsule of the *Hypnum Sericeum*, with its Calyptra.

Fig. 2.—The same Capsule with the Calyptra removed, shewing its Operculum.

Fig. 3.—The Operculum taken off, shewing the Ciliæ, 4.

Fig. 5.—A very highly magnified view of the same Capsule, with its Ciliæ, ready to discharge its seed, 6.
—The neck of the Capsule, 7.

SECTION IV.

On the Genera and Species of Plants.

HAVING endeavoured to give you an idea of Linnæus's first Divisions of Plants, his Claffes and Orders, we proceed to explain the two next Divisions, the Genera and Species.

When we find the parts of Fructification in different plants have a certain peculiarity of structure, we consider these as forming a genus or family of plants. It is often found that whilst they agree in this peculiarity of structure in the Fructification, they differ in some other part of the plant, as

the root, stalk, leaves, &c. we say such a plant is a species of that genus.

To illustrate this matter we shall take two plants that are familiar to you, the *Ranunculus Acris*, and the *Ranunculus Repens*. These two plants agree as nearly as possible in their parts of Fructification, and are therefore of the same genus, but differ particularly in the stalk, the one growing always upright, the other creeping on the ground, consequently are different species.

We may remark to you, however, that there are few genera in which *all* the parts of the Fructification are constant throughout all the species; if we take a view of the genus *Iris*, for example, we shall find a considerable variety in the structure of some of the parts of the Fructification; but notwithstanding this variation of structure, which is often sufficient to sub-divide the species, or at least after investigation, to afford a specific character, yet still from some agree-

ment in the general structure, such a leading feature may be obtained, as for the most part may distinguish the genus.

Of the several species of *Iris*, we find some that have bearded *Nectaria*, and others that have none; Linnæus therefore makes two divisions in the species of this genus. Again, the Germen in many of this genus is three-cornered, and in a few of them it has six angles, as in *Iris Spuria*.

This deviation then in the generic character, is of use in subdividing the species, and frequently affords a specific character. Thus then you see that though there is a certain peculiar agreement, or leading feature, in the appearance of the parts of fructification belonging to the same genus, you find them liable to a considerable variation.

Many flowers afford generic characters which are remarkably striking, particularly such as have *Nectaria*. We shall select a few

of those genera whose parts of fructification are large and obvious.

IRIS ; Stigmata petaliformi

RANUNCULUS ; Porimelliferi

ACONITUM ; Nectaria 2-pedunculata recurva.

HELLEBORUS ; Nectaria bilabiata tubulata.

ATROPA ; Cor. campanulata, Stam. distantia.

It were to be wished that the characters of the genus were equally obvious in all, but it is much to be regretted that in many of the Classes, especially those which are termed Natural Classes, as those of the *Pentandria Digynia*, including the umbelliferous plants ; the *Didynamous*, *Tetradynamous*, and *Diadelpheous* plants particularly ; the whole of each of these Classes seems to form but one large family, and the genera run so into each other, that it is extremely difficult to ascertain the limits of each.

As we observed to you, the character of

the genus was drawn from the fructification only, so the character of the species may be drawn from any part of the plant whatever, but most commonly from the root, stalk, leaves, or modes of flowering. We shall shew you a few examples in which the specific character is taken from their several parts. The root frequently affords an exceeding good specific character, whether we consider its duration or form, but never ought to be used when other sufficient marks of distinction can be found, as it is not to be seen without pulling up the plant, which in all cases is not eligible.

ROOT, *Ranunculus bulbosus*.

Carduus arvensis—*Iris Xiphium*.

STALK, *Ranunculus repens*—*Ranunculus acris*—*Poa pratensis*—*Poa compressa*.

Poa trivialis.

LEAF, *Antirrhinum Linaria*.

Antirrhinum Cymbalaria.

SEED-VESSEL, *Papaver Argemone*.

SEEDS—*Ranunculus arvensis*

Thus you see there is scarce any part of a

plant but what may afford a specific character ; the whole art consists in selecting such a one as is strikingly characteristic ; we cannot say that Linnæus's are always so, but when we consider how much has been done by that great man, instead of censuring, we might rather wonder at the perfection to which he has brought the science.

Besides the divisions of Classes, Orders, Genera, and Species, there is another division called a Variety, which in general is more regarded by Florists than Botanists. A Variety is generally the effect of accident or culture. All flowers differing from their usual colour, all double flowers, in short all preternatural appearances arising from what cause soever, are considered as varieties.

It is however in many instances extremely difficult to decide betwixt a Species and a Variety ; the best criterion is culture ; if a plant continues to assume the same appearance when cultivated in a variety of soils, we may safely consider it as a species.

FINIS.

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Fig 1.



PLATE XCI.

ON THE GENERA AND SPECIES OF PLANTS.

Fig. 1.—Illustrating a specific character, although it does not alter the Genus; it is of great use in dividing the Species, which, in some tribes of Plants, would be very difficult to describe without such a definition; this Iris, as have many others, has a bearded Nectary up the base of the Petals, whereas many have none at all.

Example.

Iris Florentina.

Plate 92

Fig. 1.



Ed Edwards del Pub by S Curtis, Florist Walworth Feb 22 1864. F Sargent sculp

PLATE XCII.

ON THE GENERA AND SPECIES OF PLANTS.

Fig. 1.—Illustrating a species of Iris, in which the bearded Nectary is entirely wanting, differing essentially from that in Plate 91.

Example.

Iris Xiphium.

Fig 1



Fig 2



P L A T E X C I I I .

ON VARIETIES IN PLANTS.

Fig. 1.—Shewing a Double Ranunculus, of a rich brown Olive colour, such as is esteemed fine amongst the Florists.

Fig. 2.—Another Ranunculus, differing only in colour from the other, being of the same Genera and Species, and equally esteemed by Florists; being but a variety from the other in colour.

Fig. 1.



Fig. 2.

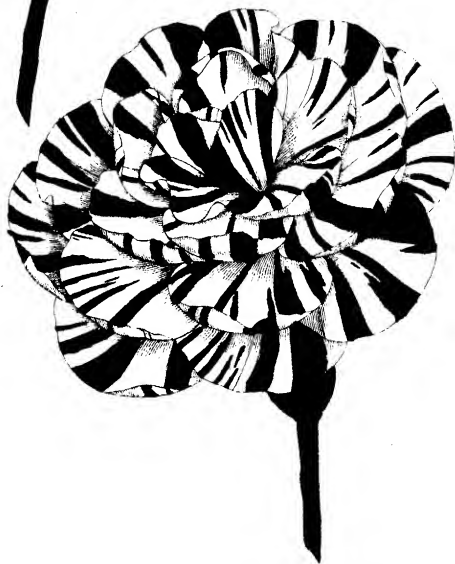


PLATE XCIV.

ON VARIETIES IN PLANTS.

Fig. 1.—Shewing a Carnation, termed by Florists, a Picotee.

Fig. 2.—Another Carnation, termed a Scarlet Bizard (from its having two Colours) differing essentially in colour, but the same with respect to their other Botanical definitions.

Fig. 1

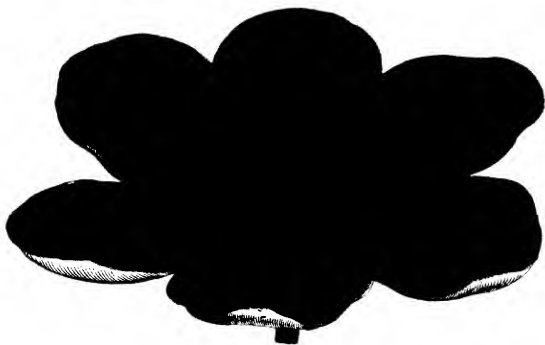


Fig. 2

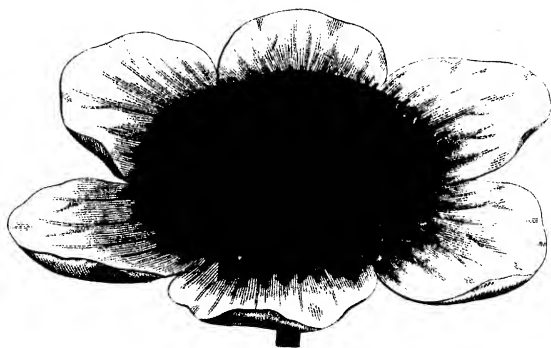


PLATE XCV.

ON VARIETIES IN PLANTS.

Fig. 1.—Shewing a Double Blue Anemone, differing in no other respect from Fig. 2. than in colour, consequently only termed a variety.

